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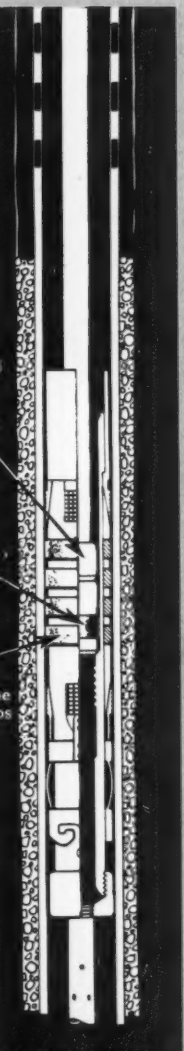
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# NORDSTROM MERCHROME-COATED MUD LINE VALVES

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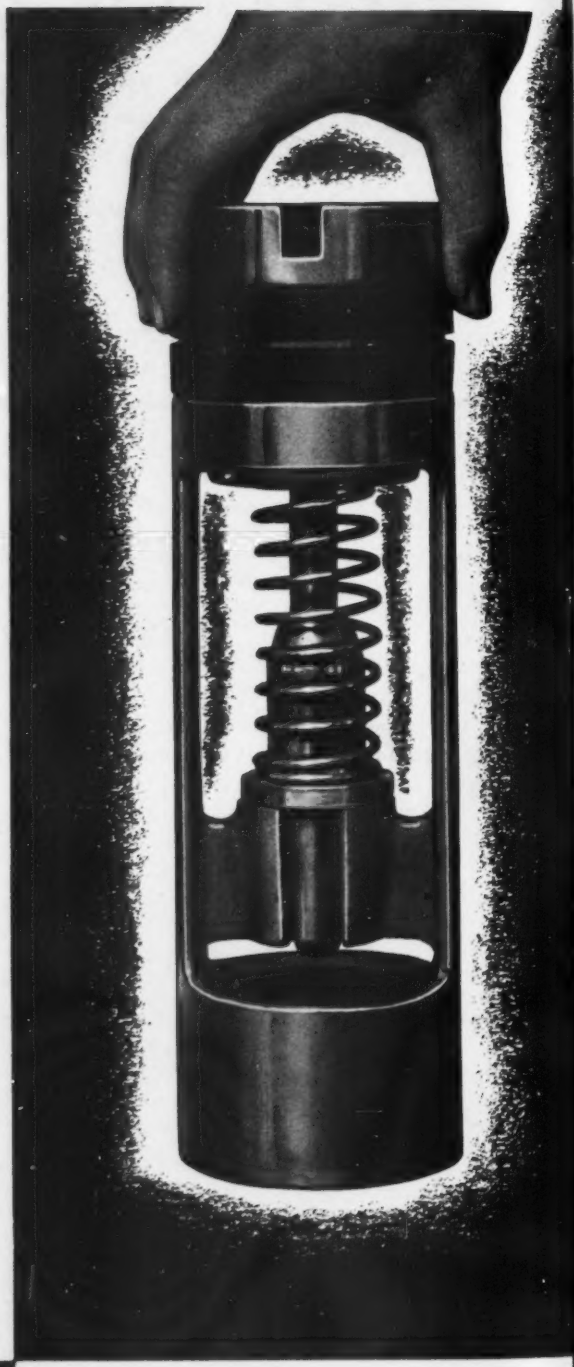

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# World-Wide Opportunity

A COMPETENT economist with an oil background and a world outlook, during the war said that the major problem confronting the petroleum industry in the postwar period would be matters concerned with distribution. He was convinced that explorationists and producers would find sufficient crude oil in old and new areas to supply all needs.

With the first anniversary of final Allied victory only a few weeks away there have been many developments to confirm this analysis. While production in this country exceeds the economic rates justified by current returns and replacement costs it is apparent that the projection of adequate world supplies was accurate.

Additional refining facilities for new production and the modernization of prewar plants are requirements of the future which will be fulfilled as materials and manpower are available. Over-all tanker capacity, because of the large war expansion in this country, is sufficient for world needs including the junking of obsolete units. There have been important developments in pipe-line construction and operation centering in big-inch and product lines and their industrial status has been strengthened.

Everywhere the possibilities in demand are apparent. Predictions of a substantial slump in oil consumption with the return of peace have not materialized. Petroleum came out of the emergency in a stronger position than ever before. In this country gains in consumption per unit have largely offset any decrease in number of units with many new markets.

World observers are not concerned with oil-consumption trends in this country which has more than 60 per cent of the world total and where the momentum of a petroleum-based economy results in constantly mounting needs. They are thinking of the other 2 billion people of the world where per capita demands by countries is generally 1 to 20 per cent of that of this country.

Among the advanced peoples petroleum consumption approaching our own is possible in stable economies removed from the shadows of war or war preparation. In the dark areas of the world where more than 50 per cent of the world population live and where oil uses are insignificant the war activities of the Allied forces demonstrated that petroleum consumption quickly expands among the nationals when standards of living improve.

Major oil companies are accustomed to spending many millions in finding new oil reserves with still greater expenditures required for development, refining, and transportation. If assured of the cooperation of governments it is certain that these operators working independently and with national interests will be willing to spend additional millions in establishing new petroleum markets with everyone concerned benefiting.

# Hallanan Named Temporary OGD Chairman; Permanent Organization Plans Under Way

*by Henry D. Ralph*

WASHINGTON. — The Interior Department's National Petroleum Council got off to a slow start at its organization meeting here June 21.

The only accomplishments were appointment of a temporary chairman, temporary secretary, and authorization of a committee to make suggestions on what to do next.

Walter S. Hallanan, president of Plymouth Oil Co., Charleston, W. Va., was named temporary chairman, and Russell B. Brown, counsel for the Independent Petroleum Association of America, Washington, was made temporary secretary. Hallanan was authorized to appoint a committee of 15 to make recommendations on such matters as permanent organization of the council, what staff it may have, method of financing, time and agenda of the next meeting, what standing committees are to be appointed, the field of interest of the council, what the Government expects of it, and similar subjects.

Only 53 of the 85 members attended, but many of the absences were attributed to the fact that the appointments were made only 3 days before the meeting.

The council was called to order by Ralph K. Davies, acting director of the new Oil and Gas Division, and the afternoon session was addressed by Secretary of the Interior J. A. Krug. Each member was handed a set of the documents pertaining to the OGD and the council, including President Truman's letter to Krug, the order creating OGD, and department press releases on the subject, and also copies of letters exchanged between Krug and Atty. Gen. Tom C. Clark regarding the application of the antitrust laws to the council's operations.

### No Official Report Made

The meeting was held in executive session and no official report was made, but after the meeting Davies told news reporters that no objection to formation of the council had been raised. He said the idea of the council appeared to have rather complete acceptance and some enthusiasm, and that the members assured him that the Government could count on complete cooperation from the industry. He said he assured the industry that there is no hidden purpose in the council plan, that no new controls or regulations are being planned, and that its only purpose is to improve the administration of present laws.

*WALTER S. HALLANAN*

Davies said that Secretary Krug simply assured the council that the Government has no designs on the industry, no plans for extending federal control, and that there is no basis for such fears as might have been entertained by some members.

No complaints were made about the composition of the council, according to Davies, though he said he announced that if the present 85 members believe the representation of the industry is inadequate they may propose additional nominations.

Davies admitted that some council members were not entirely satisfied with the attorney general's letter, but he said most of them wanted to discuss it with their lawyers before expressing an opinion. He said there was some disappointment that the letter did not give more complete protection from antitrust prosecution, and that some suggested that later on the council should ask for more specific information on how antitrust clearance can be improved.

One change in the council membership was made after the original announcement of personnel. Hugh Glenn, Los Angeles, new president of the Petroleum Equipment Suppliers Association, was substituted for Fred J. Spang, former president. This is one of the ex-officio memberships on the council.

In accepting the temporary chairmanship of the council Hallanan told Krug that "we are here in response to your invitation to represent an industry that has never failed to cooperate with the Government in any proper way.

"The creation of the oil and gas division in the Interior Department with a concentration of authority to deal with the petroleum industry's problems, is a commendable step and we are pleased that you have moved in this direction. . . .

"Representatives of every segment of the industry, whom you have named as members of the National Petroleum Council, are here today in response to your request. . . . We are anxious to proceed deliberately in exploring the possibility of a continuance of the Government - industry team for the promotion of the public interest. However, we do so with a determined feeling that there should be no infringement by Government upon the principles of complete independence of the petroleum industry in the conduct of its business.

### Basis of Cooperation

"We are anxious to give cooperation in every way to promote the public interest and for the attainment of those goals to meet every requirement which the petroleum industry will face in the years that lie ahead. That cooperation, however, must be on a basis that will at all times maintain the independence of the industry free from government control or domination. I speak with every confidence that both you and Mr. Davies would agree that the industry must at all times be alert to its responsibility to maintain its complete freedom from government control. Through this National Petroleum Council and the Oil and Gas Division of the Interior Department, which you have created, we can promote a cooperative effort that will at all times maintain that independence and at the same time promote the industry's welfare and the Government's understanding of petroleum prob-

# The Krug-Clark Correspondence

TEXT of the correspondence between Secretary of the Interior Krug and Attorney-General Clark in regard to the formation of the National Petroleum Council follows:

The Secretary of the Interior,
Washington, D. C.,
May 24, 1946

The Honorable Tom C. Clark,
Attorney-General
Department of Justice

My dear Mr. Clark:

Pursuant to the President's letter of May 3 to the secretary of the interior, I propose to establish an industry organization to be known as the National Petroleum Council. It will be the purpose of this organization to provide a competent, responsible and representative body through which the vast abilities and experience of the petroleum industry will be conveniently available to advise and consult with me and with the Oil and Gas Division of the Department of the Interior.

It will be the duty and function of the National Petroleum Council:

(a) To advise or inform me or the director of the Oil and Gas Division with respect to any matter relating to petroleum or the petroleum industry submitted to it by the secretary or director, and

(b) To raise on its own motion any matter relating to petroleum or the petroleum industry within the purview of the President's letter of May 3, 1946, and, after approval by me or the director of the Oil and Gas Division, consider such matter and advise and inform me or the director with respect thereto.

In accomplishing its purpose the National Petroleum Council will be expected to obtain, compile and analyze all pertinent and available facts, figures and other data wherever appropriate with respect to any matter which may be properly before it. In this connection the council will be authorized:

(a) To direct such inquiries and questionnaires to such companies, organizations, or persons as may be necessary or appropriate.

(b) To ask and receive expert assistance from any company, organization, or person.

The council, after compiling and analyzing all available and pertinent data with respect to any matter which may be before it will, if the council deems it necessary or advisable, reduce to writing such specific proposal with respect thereto as it deems necessary or appropriate and shall submit it with a statement of facts and reasons to me or the director of the Oil and Gas Division.

The council will be expected to maintain a small staff, with clerical and minor administrative duties, and to employ such persons as it finds necessary for carrying out its duties and will be authorized to appoint such committees as it deems necessary for investigation and report on specific problems. The membership of these committees may or may not be drawn, in whole or in part, from the membership of the council. Minutes will be kept of all meetings of the council, and copies will be filed in the Oil and Gas Division.

Operating expenses of the National Petroleum Council will be met from a fund to which voluntary contributions may be made by companies or individuals engaged in the petroleum industry upon solicitation by the council.

I should appreciate an early expression of your views with respect to the establishment of the National Petroleum Council and the functions, duties and authorities which it is proposed the Council shall have, with specific reference to the relation of the antitrust laws and the attitude of the Department of Justice thereto.

Sincerely,

J. A. KRUG.

Office of the Attorney General
Washington, D. C.
May 27, 1946

Honorable J. A. Krug
Secretary of the Interior
Washington, D. C.

My dear Mr. Secretary:

I have your letter dated May 24, 1946, in which you indicate that you propose to establish an industry organization to be known as the National Petroleum Council. You state that the purpose of this organization will be to provide a competent, responsible, and representative body through which the experience of the petroleum industry will be conveniently available to advise and consult with you and with the Oil and Gas Division of the Department of the Interior. (Here followed a summary of Krug's original description of the council's scope and functions.)

You have asked for an expression of my views with respect to the establishment of the council and the functions, duties and authorities which it is proposed the council shall have with specific reference to the relationship of the antitrust laws and the attitude of the Department of Justice thereto.

The Department of Justice recognizes that committees such as you have proposed may be a valuable source of information and advice. On April 26, 1944, and again on August 7, 1944, the department issued public statements intended to clarify the relationship of the antitrust laws to such committees which were formed during the war. The substance of those statements is equally applicable to industry committees formed after the termination of hostilities.

The Department of Justice has never taken the position that consultation by any industry committee with the government violates the antitrust laws. The department has no objection to the formation of industry committees to advise and consult with government agencies. As a general matter, the formation of such a committee to advise any particular department of the government is the responsibility of that department.

As the department has previously stated, consultation, of course, does not involve the determination by the industry advisory committee itself of policies or the administration of programs which should be the responsibility of the government agency. The authority to consult and advise should not be considered as implying that members of such committees are authorized to get together and reach an agreed position in anticipation of such consultations. The determination of policies are the sole responsibility of the government agency served by the committee.

Of course, membership on the council or on any of the committees cannot be regarded as conferring on the participants any immunity from the antitrust laws. If apart from the legitimate activities of the Council or the committees the members thereof should agree on any private plan or program as a group or take part in any such plan or program, the department will feel free at all times to invoke, if necessary, the antitrust laws against the participants notwithstanding the fact that some or all of them may have been members of an industrial advisory committee.

While membership on any committee is a matter for determination by the government agency sponsoring the committee, the Department of Justice believes that provision should be made so that all groups are afforded representation on the committee and no group is prevented from bringing its grievances or suggestions to the Government. The advisory committee should not be permitted to become the exclusive channel in the industry for the submission of the industry's views to the Government.

I understand that you will inform persons appointed to the council and to the committees of the contents of this letter.

Sincerely yours,

TOM C. CLARK,
Attorney General.

---

lems in a way that will be enormously helpful."

On the eve of last week's initial meeting of the council, Senators Edwin H. Moore (Rep., Okla.) and Joseph C. O'Mahoney (Dem., Wyo.) in separate statements asserted that policy-making is the function of Congress, and not that of OGD or the Petroleum Council.

Senator Moore sharply attacked Krug for allegedly attempting to usurp Congress' authority. He said the formation of such a committee as the National Petroleum Council was not within the prerogative of the administration, as it is ostensibly for the purpose of fixing policy and therefore should have been created by Congress. The senator said he felt the appointment of the council should have been delayed until after the Senate petroleum resources committee had had an opportunity to present a national oil policy to Congress on the basis of its extended hearings. If there is to be a partnership between industry and Government, then, he continued, Congress should set the standards.

Senator O'Mahoney, chairman of the petroleum resources committee, said "it may become the duty" of the Senate committee to recommend a statute which will specify the conditions for the selection of such an industry group as the Petroleum Council.

"I confess, however, that I feel there is no need for our impeding the reorganization of government activity, or the coordination of the government departments at this time, since it is clear, first, that no new policies will be attempted to be established without recommendation to Congress, and second, that reorganization of the Government departments can take place under the reorganization act, which means submission to Congress.

"Therefore, if this industry council, as Mr. Davies has described, doesn't meet the judgment of the industry with respect to geographical representation and representation of various branches of the industry, that is a matter which can be readily corrected, inasmuch as I assume it will continue to be the intention of the Interior Department and the Oil and Gas Division to consult the committees of Congress."

At an earlier meeting of the Senate appropriations committee, Senator Moore was outvoted when he objected to approval of the $449,516 appropriation for the division until its functions and council's are clarified.

# Oil-Price Decontrol Dropped, But Issue Still Unsettled

WASHINGTON.—The Senate provision specifically prohibiting price ceilings on petroleum after June 30 was dropped from the price-control extension bill as revised by the conferees late Monday night, but the conference report contains other provisions making it inevitable that oil prices will either be decontrolled or substantially increased in the very near future.

The House Tuesday passed the compromise bill by a 265-106 vote. The Senate was scheduled to begin consideration of the measure Wednesday.

The new decontrol provision declares it the policy of Congress that unnecessary or unduly prolonged controls over prices are inconsistent with the return to a healthy peacetime economy, and that adequate prices are necessary stimulants to desired production. Office of Price Administration is directed to promote the earliest practicable balance between production and demand and to terminate control of prices as rapidly as possible.

Nonagricultural commodities not important in relation to business costs or living costs are to be decontrolled as rapidly as possible, and not later than December 31. If petroleum should not be considered, a rule in the new bill provides that maximum prices shall be promptly removed whenever the supply of a commodity exceeds or is in approximate balance with the demand therefor. Under this section it is the duty of the administrator to remove maximum prices upon his own initiative whenever the standards of the bill are met. If OPA fails to act promptly an industry advisory committee may petition for decontrol if it believes supply and demand are in balance, and if there still is no action the committee may appeal to a new price-decontrol board which will have power to order removal of price controls.

No maximum price may be maintained which is below the price of a producer, manufacturer, or processor in October 1941, increased by an amount equal to the increase in the weighted average of the per-unit costs of a reasonable number of typical operators. All costs are to be included which are considered as such under the established practices of the industry. It will not be necessary to obtain detailed accounting figures from any company which does not already have such figures, nor to obtain detailed accounting reports from more than a reasonable number of typical firms, but OPA is directed to reach a conclusion promptly from the best evidence available to it. The industry advisory committee may apply to OPA for such adjustments and if action is not taken within 60 days the committee may appeal to the emergency court of appeals.

The stripper-well subsidy is saved for a few months by the conference bill, which specifically provides that it may be continued even though no maximum prices are in effect on petroleum. There also is a provision that when any subsidy is reduced or terminated the maximum price is to be correspondingly increased but this provision is not to apply to transportation subsidies and differential subsidies to high-cost producers. This apparently leaves continuation of the stripper-well subsidy within the discretion of the administration without respect to any action on petroleum prices.

However, the conference bill carries only $869,000,000 for all subsidy programs except the special ones for copper, lead, zinc, rubber and tin, and provides that these subsidy programs shall be progressively reduced and terminated no later than April 1, 1947. This gives the administration discretion to apportion the subsidy money among the various programs as it sees fit, which could mean that the stripper-well subsidy might be reduced or terminated prior to next spring.

# A.P.I. Production Group Names Chairmen

DALLAS. — The general committee of the production division of the American Petroleum Institute meeting here Monday elected four district chairmen and heard reports showing the oil industry saves an estimated $15,000,000 annually through the widespread acceptance of A.P.I. equipment specifications.

District chairmen chosen were David Frame, Humble Oil & Refining Co., Southwest District; C. P. Dimit, Phillips Petroleum Co., Mid-Continent District; D. T. Ring, Preston Oil Co., Eastern District; and A. C. Rubel, Union Oil Co. of California, Pacific Coast District. L. T. Potter, Lone Star Gas Co., was named secretary of the committee.

The meeting of the general committee of the production division preceded the meeting of the A.P.I. board of directors. Among subjects studied by the directors were the oil industry's current construction program, expanded research activities in the industry, Office of Price Administration controls, and the Department of Interior's new Oil and Gas Division. The directors also heard reports from committees on postwar activities and discussed a tentative program for the newly-formed agricultural development committee.

In reports from subcommittees, the general committee of the production division was told at its meeting that since last November, 109 committee meetings covering all production phases were held and that 1,778 oil men now serve on 59 functional production committees. Information on committee activities has been constantly exchanged by mail, and the four district meetings held this spring in Pittsburgh, Oklahoma City, Shreveport, and Los Angeles had a total attendance of more than 2,100, the subcommittee reports said.

Carl A. Young, secretary of the production division, reported that 90 per cent of the oil field equipment in use and 497 manufacturers use A.P.I. specifications saving the industry $15,000,000 annually. About 2,500 subscribers to A.P.I. specifications are now listed, and more than 25,000 pieces of literature on equipment specifications, on drilling and production practices, on measuring, sampling, and testing crude oil, natural gas, and natural gasoline, and on fundamental research projects are distributed annually. Thirteen active chapters hold meetings and have a total membership of 2,500. The general committee adopted resolutions commending the work of the standing committees of the production division.

## California Standard to Take Over Properties

LOS ANGELES.—Operation of two producing properties in Santa Barbara County, California, known as the Magenheimer and Tognazzini leases in the Gato Ridge field, will be assumed by Standard Oil Co. of California on July 1, the company announced last week. The leases have previously been operated by Petrol Corp.

Petrol's interest in the leases was acquired by Standard of California in 1941. Petrol Corp. at that time agreed to continue operation of the properties until now.

# THIS WEEK

**REGULATION**—National Petroleum Council holds initial meeting in Washington. . . . Begins unauspiciously with some industry opposition apparent. . . .Walter S. Hallanan, Plymouth Oil president, named temporary chairman, and Russell B. Brown, I.P.A.A. counsel, chosen temporary chairman. . . . Senator Moore attacks Krug, asserting formation of council a function of Congress, not the administration. . . . Outvoted in attempt to block OGD appropriation. . . . Not all members of new council reported satisfied with antitrust "clearance" from Justice Department. . . . ¶Proposal requiring electric logs in Texas dropped. . . . Similar plan meets opposition in Oklahoma.

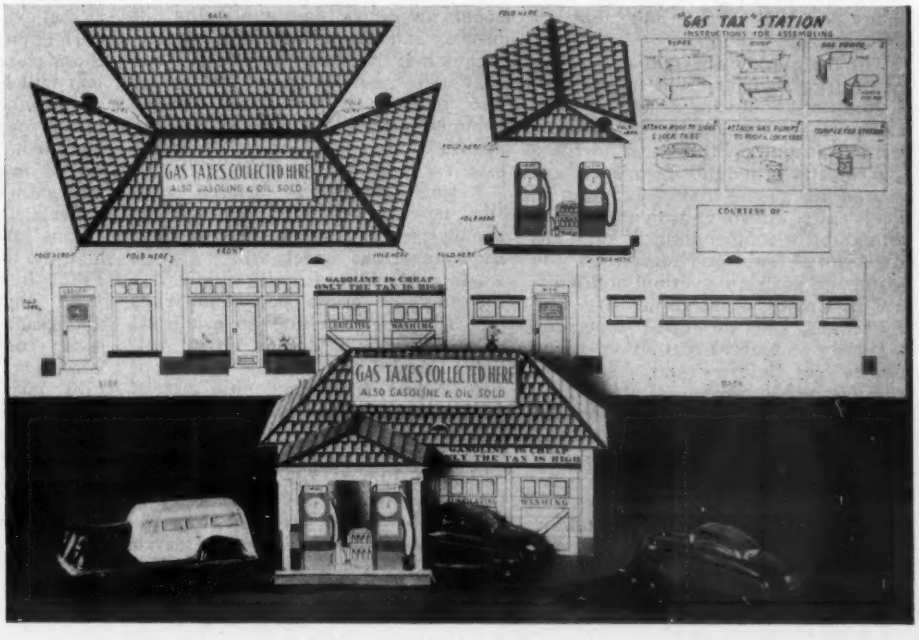
**PRICES**—Congressional moves in OPA extension fight hold oil industry attention. . . . House-Senate conference bill eliminates provision for automatic decontrol of petroleum, other commodities. . . . Specifies removal of controls where supply and demand are in approximate balance and sets up decontrol board empowered to override OPA. . . . ¶Oil markets affected by possibility of decontrol. . . . Few offerings reported with suppliers waiting for outcome in price control maneuvers. . . . Most gasoline moving at ceiling in Mid-Continent and Gulf area. . . . Slight easing in supply of residual and premium-grade motor fuel reported. . . . ¶Gasoline demand continues to mount under heavy consumption. . . . Gains 34,000 bbl. to total of 2,172,000 bbl. daily in week ended June 15.

**PRODUCTION**—Crude output in week ended June 22 falls back slightly from record figure of previous week. . . . Total production drops 9,560 bbl. to 4,954,850 bbl. daily (exclusive of 26,200 bbl. daily of condensate). . . . ¶Crude stocks register marked gain. . . . Up 1,517,000 to total of 221,932,000 bbl. . . . ¶Automobile production expected to swing rapidly upward with settlement of major strikes. . . . ¶Rubber Manufacturers Association reports new peacetime tire production record in April. . . . Output totaled 5,514,751 units. . . .

**TRANSPORTATION**—Interstate freight rates hiked 6 per cent. . . . Increase widens territory in which pipe line material can be marketed at an advantage. . . . ¶Independent Natural Gas Association committee asks CPA to allocate more steel for pipe line pipe. . . . Says situation threatens completion of gas lines scheduled for completion before next winter's heating season. . . . ¶Magnolia Pipe Line and Texas Pipe Line reveal plans to build new products line in Texas. . . . Magnolia will lay 180 miles from Beaumont-Port Arthur area to Hearne. . . . Texas will lay 135 miles from Hearne to Dallas-Fort Worth area and 160 miles to San Antonio. . . .

**INTERNATIONAL**—First large shipment of Kuwait crude to the United States due at Gulf's Philadelphia refinery in August. . . . Shipment of 100,000 bbl. will be used in test run at Gulf's plant. . . . ¶Egyptian Government reported seeking construction of refinery at Cairo if successful in efforts to have Trans-Arabian pipe line terminate in Egypt. . . .

**REFINING**—WAA recommends to Congress that 13 butadiene and 15 copolymer plants in synthetic rubber program be sold. . . . Leasing arrangements to be considered if satisfactory sale terms not arranged. . . . ¶Refinery runs show slight drop in week ended June 15. . . . Down 28,000 bbl. to 4,799,000 bbl. daily. . . .




*The oil industry's fight against additions to already high taxes on its principal product—gasoline—is taking this form in Maryland. In Baltimore, dealers are distributing cardboard model "gas tax stations" designed to carry the message that "gasoline is cheap, only the tax is high." Reports indicate some 30 states now have higher motor-fuel taxes under various stages of consideration. The Baltimore "gas tax station," which can be assembled by children and used with toy automobiles, is being distributed through sponsorship of the Maryland Petroleum Industries Committee*

*P. C. Keith, standing, left, president, Hydrocarbon Research, Inc., testifying in the natural gas investigation of the Federal Power Commission. Commissioners on the bench are Claude L. Draper; Nelson Lee Smith, vice chairman and supervising commissioner of the investigation; Leland F. Olds, chairman; and Harrington Wimberly. Facing camera below the bench is Burton N. Behling, director of the natural gas investigation. Right, foreground, watching Keith, is former Congressman Wesley Disney, counsel for the Independent Natural Gas Association*

# Technical, Statistical Data Mark Early Gas-Hearing Testimony

WASHINGTON. — Technical testimony on statistics, reserves, research, and new uses for natural gas occupied most of the first week of the Washington series of hearings in the natural gas investigation of the Federal Power Commission, and this week the hearings turned to testimony of coal, railroad, and labor organizations.

The main body of testimony by the natural-gas industry will not be presented until about the middle of July, except that occasionally an industry witness is put on the stand to fill a gap in the schedule. Two such appeared during the first week: John H. Poe, Tulsa attorney, who offered as an exhibit a compendium of state gas regulatory laws and described the history of gas conservation; and Samuel H. Crosby of E. Holley Poe and Associates, who submitted papers on a survey of federal regulation of the natural-gas industry and a study of administrative procedure of FPC.

The most interesting testimony of the entire week was offered by P. C. Keith, president of Hydrocarbon Research, Inc., who gave a highly technical description of the processes developed by his company for making gasoline from natural gas and for gasifying and liquifying coal. Much of the information was the same as contained in the paper Keith read at the convention of the American Gas Association in Cincinnati May 7 and 8, and printed in The Oil and Gas Journal of June 15, describing in detail the new plant being erected by his company at Brownsville, Tex., for Carthage Hydrocol, Inc. Keith did not present a prepared paper, but spent an entire day explaining his process and his predictions of the effect it may have on the oil, gas, and coal industries. He spoke informally, and was closely questioned by the commissioners, FPC staff men, and attorneys for coal and other interests.

Keith's conclusions, briefly, were that new processes in hydrocarbon chemistry will result in new markets for natural gas which will make its waste uneconomical, will supply liquid fuels if crude petroleum runs out, will put a ceiling on crude oil prices, and, in a decade or so, will make bituminous coal a source of both liquid fuels and city gas at prices competitive with petroleum and natural gas.

Most of the week was devoted to expert testimony by technicians of the U. S. Geological Survey and the Bureau of Mines on statistics, reserves, recycling operations, research and synthetic fuels development. For the most part these witnesses refrained from expressing conclusions or recommendations, but in general their testimony pointed to future discoveries of large natural gas reserves, better technology in conservation and use, new uses for gas through hydrocarbon chemical processes, and eventual development of new synthetic fuels at economical costs.

Strong opposition to any attempt of the federal Government to interfere with the production and gathering phases of the natural gas business was voiced by Poe when he testified as a witness on behalf of the Natural Gas Industry Committee.

"While perfection beyond the point of human error will never be reached," he said, "it seems logical to believe that a greater degree of perfection will be reached quicker if those close to the scene of the problem will be left to their task without interference from federal regulations, which may be considered as reaching back from the field of interstate commerce into the field of production and gathering."

Poe's statements supported the positions taken by gas-producing states and the natural-gas industry during FPC's field hearings.

"A physical characteristic of oil and gas," Poe declared, "makes necessary conservation laws that are unnecessary in the cases of other natural gas resources. That physical characteristic is the migratory nature of the substance in the ground. The public generally is concerned with the conservation of all natural resources, but because of the migratory character of oil and gas, each owner of property over the common reservoir is directly interested in the production practices of his neighbors. . . . Poe went on to show that

the courts have taken the position, through the years, that the matter of getting the natural resource out of the ground and into interstate commerce is one of state concern, not federal, and that the states have capably prevented waste of natural gas by adequate legislation and regulation, , , , These state laws and the administrative practices, he added, "are now keeping pace with engineering and technological developments in the industry."

**Exhibit on Fuel Reserves**

Keith presented an exhibit which showed fuel reserves as of January 1, 1946, if converted into crude oil, would make a total of 6,326,100,000,000 bbl. This he divided into 21,100,000,000 bbl. from crude itself, 25,000,000,000 bbl. crude possible from natural gas and 6,280,000,000,000 bbl. from coal synthesis. He said in his opinion there will be commercial production of gasoline from natural gas and from coal within 5 years.

In discussing progress made on the gasification of coal, Keith said that much has been learned from the Germans. He said that his company had experimented in the production of city gas from coal and had obtained a gas of from 600 to 900 B.t.u. at costs estimated at 17 cents per thousand cubic feet. Plans have also been made on the production of a 900-B.t.u. gas from coal, with a view to the possibility of doing the gasification work in a coal region such as West Virginia and piping it to a consuming area such as New York City. Cost of this gas was estimated at about 19 cents per thousand cubic feet, with transportation costs bringing it to 24.2 cents at the city gate at New York. This was viewed as the cheapest way of getting fuel energy from coal areas to consumer areas, and he estimated that 10,000 tons of coal would produce, by this process, about 200,000,000 cu. ft. of gas.

Keith expressed belief, from experiments conducted by his organization, that gasoline can be made from coal for 6 cents a gallon, assuming that cost of coal is $2.00 per ton, and there would probably come a time in the not-too-distant future when this price would be competitive.

Discussing the uses to which natural gas now is put, Keith pointed out that if all the chemicals that are made in the United States in 1946 were to be made from natural gas as a raw material, the consumption would not be more than about 142,000,000,000 cu. ft. He said the use of natural gas for making carbon black will not increase because of the improved methods in that industry, and that assuming a consumption of about 4 trillion cubic feet of gas per year for use in manufacturing gasoline, there would still be ample quantities of natural gas available for use as fuel.

Charles B. Carpenter, petroleum engineer, Bureau of Mines, presented a paper at the hearing on the conservation of natural gas through pressure maintenance and gas cycling. He said that under most conditions, pressure maintenance by the injection of gas aids in producing more oil with a lower lifting cost in a shorter time, and if carried to the end point would result in the storage of natural gas that can be marketed as a fuel.

Hugh D. Miser, section chief, geology of fuels, Geological Survey, discussing "Geological Survey's Studies and Potential Reserves of Natural Gas," told the commission that "the potential gas reserves yet to be discovered lie in deeper zones in the producing fields, in extensions of the present fields, in new areas between the fields of the present producing regions, and in regions that are now not producing gas. The reserves remaining to be discovered in the future will probably be found, as in the past, in connection with the search for petroleum.

"Our knowledge of the geology of the United States is very incomplete and most of the country remains to be mapped and studied in detail. The producing regions that invite the testing of deeper zones and new nearby areas include those of the Appalachians, those in the Central States from the Gulf of Mexico to the Great Lakes, and those in California and the Rocky Mountain region. It is appropriate to mention also Alaska, Puerto Rico, and the continental shelf along the Gulf Coast states and California, whose oil possibilities are the subject of present interest."

## Stripper Subsidies Hiked Other Price Rules Altered

WASHINGTON.—Price raises, ranging from 5 to 35 cents a barrel in producers' ceiling prices for crude oil from five stripper pools in four states and retroactive to June 1, were announced by the Office of Price Administration last week.

The five pools and increases are: In Illinois, Keensburg Consolidated, 5 cents, and Friendville, 35 cents; Mount Carmel pool, in both Illinois and Indiana, 20 cents; the DeSoto pool, Louisiana, 30 cents; and the Koopman pool of Texas, 20 cents.

The OPA also announced that Edwards pool in Texas, previously given an increase of 25 cents a barrel, has been removed from the subsidy lists and the increase revoked. It was held that Edwards is part of the Waddell and the combined field is not eligible for an increase.

Other action taken by OPA last week permitted manufacturers of carbon black to enter into contracts for natural gas at ceiling prices already applicable to pipe-line purchases for use as heat, light or fuel. This action, effective July 1, is designed to prevent the diversion of gas supplies at the expense of carbon-black manufacturers.

Another announcement concerned gatherers and marketers of crude oil whose ceiling prices were frozen below costs. Such operators are now authorized to apply for higher price ceilings and OPA will make individual adjustments. These adjustments will be granted only where the purchaser is unable to obtain deliveries at the same or lower price and where a need will not be created for an increase in prices at another delivery point.

An increase in ceiling prices was also granted for three crude-condensate fields. Paloma and South Coles Levee fields, California, and the Opelika field, Texas, have been given a uniform ceiling price of $1.45 a barrel, to which may be added the overall 10-cent increase recently allowed in all crude oil ceilings. This represents an increase of 12 cents a barrel in the California fields and 20 cents a barrel at Opelika.

Further price raises authorized by OPA affected manufacturers of power-operated gasoline-dispensing pumps. Existing ceiling prices of this equipment were increased by nearly 7 per cent for a total increase of 16.1 per cent since October 1941.

## Producing Properties Sold In North and East Texas

DALLAS. — Three transactions involving the sale of producing properties and some undeveloped acreage in North and East Texas were reported here last week.

Pan American Production Co. acquired its first producing properties in East Texas field with the purchase of 58 wells for a reported $3,300,000. The company bought 44 wells on eight leases from H. R. Smith, San Antonio, and 13 wells on one lease from Henry Oil Co.

Snowden Oil & Gas Co. obtained 18 producers and undeveloped acreage in the Garvey sector of Young County from Kerlyn Oil Co. and Phillips Petroleum Co. Consideration was reported at $300,000 with Snowden obliged to drill 20 wells. Phillips was reported to have held an override on its share of the properties. Total production is about 1,000 bbl. daily. Involved in the transaction were some 5,400 acres.

Leases totaling 494 acres in Montague County were sold by Larry S. Hults and Tom Owens, Fort Worth operators, to Hays Robinson and associates, Chicago. Consideration was reported at $198,000. Terms included an agreement to drill an Ellenburger test on the property in the near future.

# International

WORLD-WIDE OIL DEVELOPMENTS

## Kuwait Crude Shipment Due at Philadelphia

NEW YORK.—A shipment of 100,000 bbl. of crude oil from Kuwait of the Persian Gulf area will be received in August at the Philadelphia refinery of Gulf Refining Co., according to information from official sources.

The crude oil is to be used as a test run at the Gulf refinery which has complete facilities for distillation and cracking operations. The company also maintains a large laboratory.

This will be the first large shipment of Middle East crude received in this country. No additional cargoes of Kuwait crude oil are expected in this country this year.

The independent sheikdom of Kuwait is located at the upper end of the Persian Gulf. A concession* covering the entire country is held by Kuwait Oil Co., Ltd., which is jointly owned by the Anglo-Iranian Oil Co., Ltd., and Gulf Exploration Co. (Gulf Oil Corp.) Previous to the world war a large reserve estimated from 5,000,000,000 to 9,000,000,000 bbl. was discovered.

Operations were resumed last summer after being closed down during most of the war period. Pipe line and loading facilities were recently completed, and it is understood that initial shipments will average around 30,000 bbl. daily. Some of the crude oil will be refined in France.

The Kuwait crude oil is sand production. Following are general specifications of the crude oil taken from the Burgan No. 2 well:

| | |
|---|---|
| Gravity, A.P.I. | 33.0 |
| Vis. at 100° F. | 49.8 |
| Flash, OC F | Below 60 |
| Pour, F. | —10 |
| Color | Greenish Brown |
| Sulfur B, per cent | 2.06 |

*A complete description of the Kuwait concession and development appeared in the August 18, 1945, issue of The Oil and Gas Journal, page 96.

## Egypt Favors Refinery With Trans-Arabian Line

CAIRO.—While a decision on the Mediterranean terminus of the projected Trans-Arabian pipe line remains undecided, it is reliably reported that if the terminus should be in Egypt that the Egyptian Government would like to make the construction of a refinery here part of the agreement with the Trans-Arabian Pipe Line Co., a subsidiary of Arabian American Oil Co., Ltd., which in turn is jointly owned by The Texas Co. and the Standard Oil Co. of California.

Officials of the Egyptian Customs Administration reportedly have completed an examination of the Minister of Commerce's note on the proposal to run the line to an Egyptian port. This note outlines the advantages of such a line to Egypt, among them being large financial gains possible by eliminating the Suez Canal and shipping tolls from the Persian Gulf.

Currently, Egypt consumes approximately 6,300,000 bbl. more of petroleum products than she produces. Anglo-Egyptian Oilfields, Ltd. (Shell)—the only producing company in Egypt—reported a production total, for the 5 weeks ending June 3, of 859,085 bbl. This figure, which represents approximately 25,000 bbl. daily, is the same as Anglo-Egyptian has been producing for the past several months.

Egypt's petroleum imports come largely from Iran, Bahrein Islands, and Palestine at an estimated cost of over $3,500,000 yearly. Government officials figure that a large proportion of this could be saved with a pipe line direct from Saudi Arabia.

## April Production of Five Companies Listed

LONDON.—April production for the following five oil companies has been reported as follows: Egypt, Anglo-Egyptian Oilfields, Ltd., 699,912 bbl.; Trinidad, United British Oilfields of Trinidad, Ltd., 396,406 bbl.; Venezuela, Venezuelan Oil Concessions, 5,664,263 bbl., of which 4,644,994 bbl. were from the Bolivar district and 1,019,269 from Maracaibo area; Ecuador, Anglo-Ecuadorian Oilfields, Ltd., 126,087 bbl.; and Peru, Lobitos Oilfields, Ltd., 167,482 bbl.

## Brazilian Council Eyes Plans for Refineries

RIO DE JANEIRO.—While the participation of foreign capital in Brazil's petroleum industry remains an unsettled issue, the construction of additional refineries and further exploration activities here appears to be a certainty.

Just how soon projected refinery construction gets under way in this country is largely dependent upon action taken by the Conselho Nacional de Petroleo (Brazil's National Petroleum Council), of which General Joao Carlos Berrato is president.

At present the Conselho is studying plans submitted by the two Brazilian nationals, Alberto Soares de Sampaio and Drault Ernanny de Medo e Silva. Other nationals who had at first indicated their desire to engage in petroleum refining were: Aristides de Almedia, Carlos Eagundes de Medo, Francisco Martins Bostos, Joa Pedro Gouveia Vierira, and Edgar Roja Gaboglia. However, the fact that only two of this number reportedly submitted refinery plans should not be interpreted as any indication that the others will drop out of projected oil refining activities, it was pointed out here by a reliable source.

### 10,000-Bbl. Refinery

It is understood that de Sampaio contemplates the construction of a 10,000-bbl. daily refinery in Brazil's Federal District (Rio de Janeiro), or in the immediate vicinity, and that de Medo e Silva has submitted an almost identical plan. De Almedia and Gaboglia are understood to have approached the council for approval on refinery construction in the state of Sao Paulo. De Almedia's plans contemplate a 10,000-bbl. daily refinery, while a 6,000-bbl. daily refinery is reported to have been in Gaboglia's plans. In all cases, the use of high-yield equipment is contemplated..

Late in January, the Conselho Nacional de Petroleo was interested in oil refineries which would be wholly-owned by Brazilian nationals, but since then other developments indicate that foreign capital may be

allowed to participate. Moreover, at that time it was contemplated that a certain percentage of the new refinery profits would be used for exploration in Brazil, as the eventual production of sufficient indigenous crude to take care of refinery needs was one of the council's uppermost aims. It is entirely possible that this provision will remain as a Brazilian objective.

The importation of crude (whether entirely from South America cannot yet be determined) would be necessary for the first few years—or until whatever time Brazil was able to develop its own petroleum reserves. A period of about 2 years is seen as the earliest date that the refineries would be on stream, after it has been definitely determined to start construction. But this, of course, also depends on the availibility of material.

The maintenance of large supplies of crude stocks in yet-to-be constructed underground storage was another feature of the council's projected plans early this year. Whether refinery operators used a certain percentage of their yearly profits to engage in the exploration of Brazilian oil themselves or turn over these profits to the council—or some agency delegated by the council—presumably will remain a decision to be made by whatever refinery interests eventually obtain permission to operate in Brazil.

#### Financial Status Examined

It is not known whether the council's original plan of requiring each refinery owner to deposit, in the national treasury, the sum of approximately $25 for every barrel of refinery capacity contemplated, as a guaranty of contract fulfillment, will be maintained. This would mean, for instance, that the company planning to build a 10,000-bbl. daily refinery would have to deposit $250,000, and under the original plan this deposit would remain in the national treasury for a period of about 2 years.

But whatever the decision as to the deposit requirement, it is known that Brazil's Conselho Nacional do Petroleo has minutely examined each applicant's projected means of financing refinery operations. And it's on this point that some observers are prone to believe that foreign capital may be allowed to participate, and to participate under conditions that would be mutually satisfactory to the Brazilian Government and to outside interests.

Brazil's present refining facilities are limited to two skimming plants whose location and daily capacity is as follows: Industrias Matarazzo de Energia, S. A., Sao Paulo, 2,500 bbl.; and Ipiranga, S. A. Cia. Brazileria de Petroleas, Rio Grande, 1,800 bbl. Two small topping plants are also located in Bahia.

Indigenous production is just about enough to supply the refineries' throughput. In normal times, imports of petroleum products approximate 9,500,000 bbl. annually. Local production comes from four relatively small fields.

## Mexico to Construct Refinery, Pipe Lines

MEXICO CITY.—Mexico's plans for the construction of a new pipe line from Poza Rica to the town of Salamanca in the State of Guanajuato and the erection of a new refinery at Salamanca have been disclosed. In addition a gas pipe line with a capacity of approximately 35,000,000 cu. ft. daily will be constructed from the Poza Rica field to the Federal District to supply the industrial needs of Mexico City and vicinity.

## Venezuelan Export Data Show Significance of Oil

CARACAS, Venezuela.—The dominant place held by oil in Venezuela's economy was again brought home by figures showing the relationship of petroleum exports to those of other commodities.

In 1945 more than 99 per cent of all Venezuelan exports by weight and some 94 per cent by value was made up of petroleum. Estimated total exports amounted to 50,364,000 metric tons valued at 1,026,000,000 bolivares. Of these totals, petroleum exports contributed 50,300,000 metric tons and 965,000,000 bolivares.

Venezuela produced an estimated 323,361,253 bbl. of oil during 1945, an increase of 26.5 per cent over 1944. Compared with 1942 production of 147,402,000 bbl., the 1945 output represented a gain of almost 120 per cent.

Venezuela, second leading oil producing country in the world, drew most of its production from the fields in the western part of the country. Eastern fields, however, have been developing rapidly and give promise of becoming equal and perhaps greater in importance.

## Canadian Exports Drop

WASHINGTON.—Exports of petroleum products from Canada during January and February 1946 were valued at $498,000, Canadian currencey, according to reports from the United States Department of Commerce. For the corresponding period in 1945, export value of petroleum products was $1,259,000. Gasoline exports for the first two months of 1946 and 1945 were $49,000 and $937,000, respectively.

# International

WORLD WIDE OIL DEVELOPMENTS

## French Production Drops

PARIS.—French crude oil production for February dropped to approximately 26,299 bbl., compared with 30,128 bbl. for January. Gas production also dropped slightly to about 313,950,000 cu. ft. in February, compared with 317,310,000 cu. ft. for January.

## Dutch Enlarging Storage

LONDON.—Oil storage at Amsterdam harbor will be raised from 10,000 tons (about 70,000 bbl.) to 106,000 tons (about 742,000 bbl.) upon completion of 14 new tanks now under construction, according to the Dutch publication, De Nieuwe Dag. The tanks are to be completed before the end of this year.

## Nationalization Announced

LONDON.—Nationalization of oil plants and refineries, together with other industries, by the Hungarian Government, was announced recently, according to official reports from Budapest. The act was described as part of an extensive economic and financial stabilization program of the government.

## Austria's Output Reported

LONDON.—Austria's annual crude production, under Russian control, is reported to be approximately 1,000,000 tons (7,000,000 bbl.), compared with 1,015,000 bbl. in 1939 and 8,491,000 bbl. in 1944. Russians are said to be seeking oil possibilities in upper and lower Austria on northern bank of Danube River with some success.

## Drilling Permits Proposed

CAIRO.—Egypt's Chamber of Deputies is reported to be considering a new bill whereby oil drilling would be prohibited without first obtaining a license issued by the Ministry of Commerce and Industry. Private land owners presumably would still be allowed to lease their land for exploration, but would have to comply with the Government's provisions in the proposed law.

## Soviet Group to Argentina

RIO DE JANEIRO.—Konstantin V. Sheevelev, head of Soviet Russia's Soyusneftexport's petroleum products export division, is also chief of the U.S.S.R. goodwill delegation recently sent to Argentina.

*Khorasan, north of Elburz, showing folding, crumpling, and thrust faulting of limestone—Upper Jurassic (?)*

# An Appraisal of Iranian Oil

**by Lester S. Thompson**

RECENT developments in the Middle East with their attendant international discussions and political disputes have brought Iran into the limelight—and, with Iran, petroleum. In popular imagination, the two subjects have become inseparable. Hardly a day passes when one does not encounter some reference to the "rich Iranian oil fields." Judging from the general tenor of much of the current comment, there would appear to be considerable misconception as to the occurrence and distribution of petroleum in Iran, its ownership, and the political and economic aspects of the situation. It is not the purpose of this article to deal with all phases of this complicated probem. Rather, in presenting briefly a broad outline of our present knowledge of the occurrence of petroleum in Iran it is hoped that some of these controversial questions may be clarified.

### Physical Features

Iran, as a political unit, covers an area of roughly 628,000 sq. miles, comprising somewhat more than half of the great Iranian Plateau. The country, as a whole, can be accurately described in two words—mountainous and arid. Although there are broad valleys and broader deserts, there are few localities where, on a clear day, one is out of sight of mountains. And, apart from the moist climate of the Caspian littoral, annual rainfall ranges from about 15 in. a year in the higher mountains to 2 in. or less in the central deserts.

Bordering the Caspian Sea, and also at the head of the Persian Gulf, are low flat plains. If one combines with these plans the foothills of the Zagros Mountains and the hilly plateau along the south coast, one has a Border Area which makes up less than 10 per cent of Iran's surface. Yet, in the present discussion, this area is most important. Not only does it contain the only oil fields thus far proved, but, for geological and economic reasons, it is probable that new developments in the reasonable future will be confined to this Border Area, whether in the north or the south.

Leaving the Border Area from either side of the country, one is confronted by an abrupt wall of high, precipitous mountains in which altitudes of from 10,000 to 14,000 ft. are common and occasional peaks rise even higher. Except for the mountainous province of Azerbaijan in the northwest, where regular trends are not as well marked, the main mountain systems consist of parallel ranges, steep and rocky, often with broad intermontane valleys. The general aspect is as though the mountain mass of Azerbaijan were split into two systems. That of the north, the Elburz, extends, with a few changes in name, eastward across the whole of Iran and into Afghanistan. On the southwest, the Zagros system follows a southeasterly direction to the head of the Persian Gulf. Thence, bending in a great arc parallel to the coast, the ranges continue into Baluchistan.

Between the two main mountain systems, there is a great central depression comprising about 35 per cent of the total area of Iran. This is typical desert country — gravels, shifting sands, saline marshes and large salt flats. Altitudes fall as low as 900 ft. above sea level in the Dasht-i-Lut which is the deepest part of this area. Even in this relatively flat

*Mazanderan, in the Elburz Mountains, on the road from Tchalousse to Tehran, showing thrust fault*

topographic division, isolated peaks and mountain ranges break the monotony of the landscape.

### General Geology

A host of articles and treatises on the geology of Iran have appeared during the past 100 years. However, with the exception of a few small areas, such as in and about the oil fields of Anglo-Iranian Oil Co., Ltd., most of the published reports are based on rapid, and often sketchy reconnaissance. Little has been done to coordinate the isolated observations, with the result that there are still many blank areas on the geological map of Iran.

It is beyond the scope of the present article to afford a complete detailed discussion of the geological history of Iran. Suffice it to say that upon a basement complex of schists, gneisses, granites, etc., presumably of pre-Cambrian age, there has been deposited a sequence of sediments, for the most part marine, aggregating many thousands of feet in thickness, in which every major geological age from Cambrian to Recent is represented at one locality or other. This sequence was by no means uninterrupted, and, at various stages, widespread breaks occurred. The most profound of these breaks took place at three separate periods—at the close of Cambrian time, at the end of the Paleozoic, and at the close of the Cretaceous. Frequent unconformities and disconformities afford evidence of several local elevations and submergence within the area during periods of otherwise continuous deposition. The break between the Upper Cretaceous and Eocene, which is a conspicuous feature in eastern and northern Iran, has an important bearing on any comparison between the oil fields of the southwest and those of the Caspian area. All data collected to date indicate that the Mesozoic sediments of both regions were deposited in the same sea. At the close of the Cretaceous, however, a general uplift, locally more or less along the axis of the Elburz Mountains, effectually separated the Aralo-Caspian area from the Paris-Mediterranean basin to the south. As a result of this separation, one finds no similarity in sequence, lithology, or fauna between the Tertiary formations north of the Elburz Mountains and those of southwestern Iran. This fact alone, even if it were not demonstrated that the southwestern oil fields were separated from the Caspian basin by great masses of igneous and metamorphic rocks, should dispel any popular notion of continuity of the oil fields. The wide differences in types of sedimentation is further brought out in the generalized geological columns.

**THE AUTHOR**

**LESTER S. THOMPSON, a graduate of Columbia University's School of Mines (1911) was for 3 years with Sinclair Oil Corp. during which time he looked after preliminary negotiations for oil concessions in northern Iran. For 4 years he was with Standard Oil Co. (N. J.) conducting regional surveys in the West Indies and over much of the African continent. He was chief geologist for Amiranian for its survey of Iran in 1937-38, and for 2 years was associated with Iraq Petroleum Co., Ltd., conducting a regional survey of the eastern Arabian peninsula, and later, detailed and regional examinations of Iran. During the recent war he was with the Persian Gulf Command, where, as special assistant to the chief of staff, he was in charge of all petroleum activities of the Command, including aid to Russia.**

### Occurrence of Petroleum

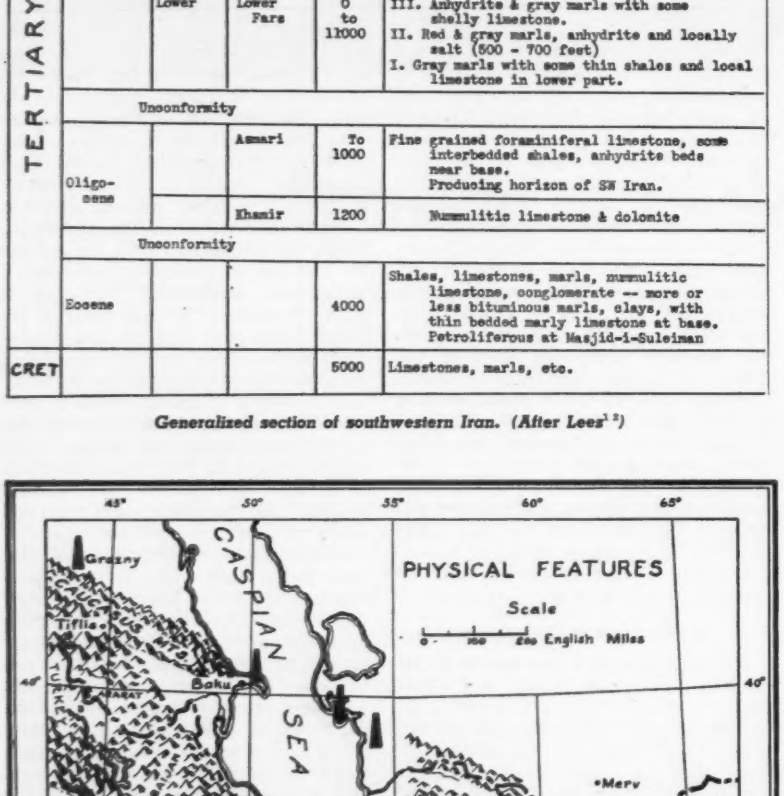
To date, the only proved oil fields in Iran are those owned and operated by Anglo-Iranian Oil Co., Ltd., in the southwestern foothills of the Zagros Mountains — Masjid-i-Sulaiman, Haft Kel, Agha Jari, and Gach Saran. With these should be included the two borderland fields of Naft Khaneh and Naft-i-Shah (operated by the same company) and also the northern Kirkuk field of Iraq. Throughout these seven structures there is a consistent geological pattern. The reservoir bed is the Asmari limestone, typically a light-colored-to-white, fine-grained, foraminiferal limestone, with some interbedded shales. It is often porous and frequently shattered in the producing areas. Its thickness varies up to 1,000 ft. The age is generally conceded to span from uppermost Oligocene to basal Miocene. The cap rock is the basal anhydrite bed of the Lower Fars Series. The typical impounding structure is a broad, fairly symmetrical, steeply flanked, closed anticline. Source beds have not been definitely established, but studies of the asphalt lakes at Hitt and Abu Zhir, in Iraq, lend weight to the hypothesis that the petroleum has migrated to its present position from older formations. Lees[1] reports that oil has been found in quantity in the Eocene underlying Masjid-i-Sulaiman, but, to date, there has been no commercial exploitation of this deeper source. Although petroleum is produced in large volume from Upper Cretaceous beds on the southwest side of the Persian Gulf (Saudi Arabia, Bahrein, etc.) there has been no systematic exploration of the Cretaceous in Iran proper. The few random wells drilled in formations of that age have not been successful.

However impressive the production

*Left: Gorge on southwest flank of Asmari Mountain exposing Lower Miocene limestone named after mountain. Right: Microphotograph showing organic structure typical of Asmari limestone. Masjid-i-Sulaiman. Depth, 569 ft. below top of limestone. (Courtesy A.A.P.G. Bulletin)*

| | Age | | Series | Thick. Feet | Description |
|---|---|---|---|---|---|
| TERTIARY | Pliocene | | Bakhtiari | To 15000 | Upper, Middle & Lower subdivisions — Gravels, conglomerates, sandstones. Continental |
| | Unconformity | | | | |
| | Miocene | Pontian | | | |
| | | Upper | Upper Fars | 3000 to 5000 | Reddish, brownish or greenish marls with bands of brown sandstone. |
| | | Middle | Middle Fars | 0 to 2500 | Pale greenish or gray marls and marly limestones. Masses of reef limestone. Some interbedded gypsum. Transition from oolitic limestone below. |
| | | Lower | Lower Fars | 0 to 11000 | III. Anhydrite & gray marls with some shelly limestone.<br>II. Red & gray marls, anhydrite and locally salt (500 - 700 feet)<br>I. Gray marls with some thin shales and local limestone in lower part. |
| | Unconformity | | | | |
| | Oligo-cene | | Asmari | To 1000 | Fine grained foraminiferal limestone, some interbedded shales, anhydrite beds near base. Producing horizon of SW Iran. |
| | | | Khamir | 1200 | Nummulitic limestone & dolomite |
| | Unconformity | | | | |
| | Eocene | | | 4000 | Shales, limestones, marls, nummulitic limestone, conglomerate — more or less bituminous marls, clays, with thin bedded marly limestone at base. Petroliferous at Masjid-i-Suleiman |
| CRET | | | | 5000 | Limestones, marls, etc. |

*Generalized section of southwestern Iran. (After Lees[1,2])*




*Map showing physical features. Map on opposite page shows concessions and proven fields*

International

records of the Iranian oil fields may be, they are not indicative of the ultimate richness of the area. Outputs of 300,000 to 500,000 bbl. per day have been maintained at times during the past few years. Economic factors rather than ability to produce have established the rate of production. Estimates based on the developed areas indicate an ultimate reserve of the order of 8 billion barrels. When one considers that there are many favorable looking structures in the same foothill belt which have not yet been explored by drilling, and where the geological conditions are apparently identical with those of the producing areas, it is reasonable to assume that the possible reserves of this part of Iran alone will be several times the above figure.

### Inland Prospects

The prospects for petroleum farther inland are less apparent. While it would be a very bold statement to affirm or deny categorically the existence of oil in untested areas, certain factors can be considered significant. In the mountain systems, both the Elburz and Zagros are made up of tightly packed folds involving chiefly Mesozoic and Paleozoic rocks. Faults and overthrusts are common. In both ranges, great masses of granites and metamorphic rocks are exposed. A considerable part of the Zagros range lies within the concession of Anglo-Iranian Oil Co., Ltd. But, even if the geological conditions were more favorable, it is probable that development would be postponed indefinitely. With so much oil available practically at tidewater, it is unlikely that any company would attempt an expensive exploration program in such a difficult region.

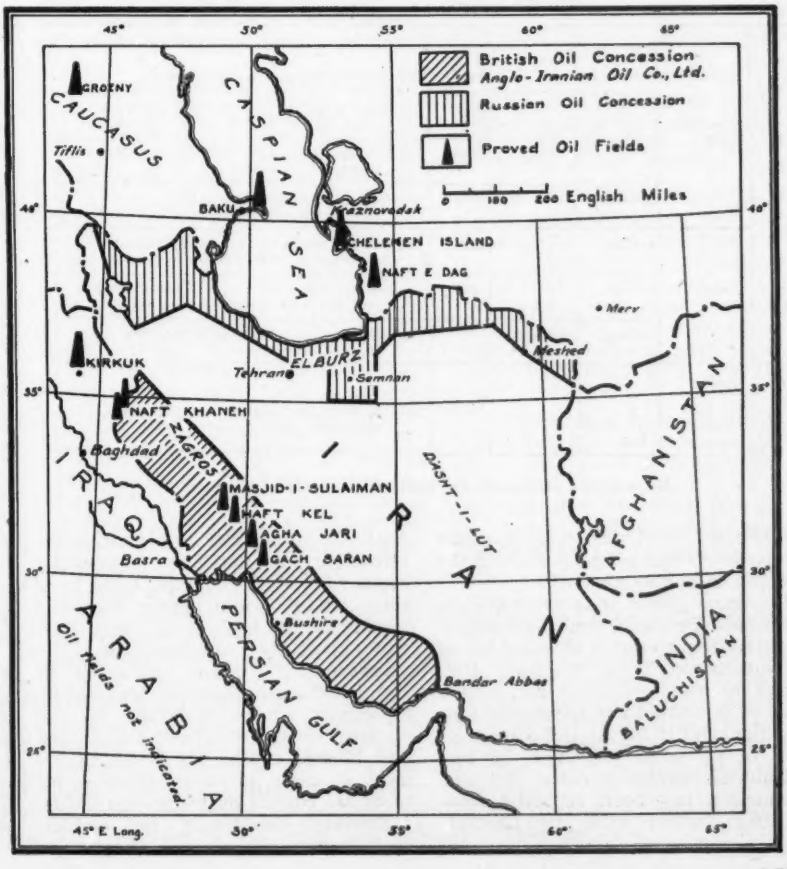
The great central depression between the two main mountain systems is also an area of uncertainty. A large portion of this region is underlain by granites, metamorphics and, in the east, by early Eocene (?) igneous rocks. This condition renders much of it unattractive as a prospective petroliferous area. In the general region between Qum and Sultanabad, favorable structures have been observed in a formation which is the counterpart of the Fars Series of southwestern Iran. Nothing is known, however, of the underlying section. As for direct indications of oil, the existence of only one seepage has been authenticated in the entire central depression. This is near the village of Semnan, 120 miles east of Tehran, in the foothills of the Elburz Mountains. It is included in the recently acquired Russian concession.

Two wells were drilled in this vicinity in the early 1930's without success. There is no indication, however, that the locations were well chosen or drilled to sufficient depth.

This brings us to the extreme northern portion of Iran—that part lying north of the Elburz Mountains. To date, no drilling has been done anywhere in this area, so that one has to rely entirely on surface geology for an appraisal of the oil possibilities. Certain large areas of igneous and metamorphic rocks such as make up much of Azerbaijan and the Elburz range, can be eliminated without further consideration. As pointed out earlier, the tightly folded high mountain ranges are unattractive. Thus the prospect for petroleum is limited practically to the Caspian Plain and to the folded hills which extend eastward along the Russian frontier. The proved and developed oil fields near enough to shed any possible light on the question of petroleum in northern Iran are those of Baku, Cheleken Island and Naft-e-Dag. Here the situation is different from that prevailing in the southwestern Iranian fields. The producing horizons comprise a multiplicity of sands in the so-called "Productive Series" of Upper Pliocene age—a sequence of sands, clays, sandstones, etc. The impounding structures are typically plunging anticlines and stratigraphic traps. The combined thickness of the Upper, Middle and Lower divisions, any one of which may be petroliferous locally, is from 3,000 to 5,000 ft. Indications of bitumen have also been found as deep as the Kown Series of Oligocene age. In these Caspian fields, as in those of southwestern Iran, it appears possible that petroleum has migrated upward from older source beds. In the absence of more direct evidence, a duplication of the Baku section might be considered as a hopeful indication of the existence of petroleum in northern Iran. The only outcrops so far discovered which can be correlated with the Upper Pliocene of Baku occur at a point about 75 miles east of the Caspian Sea. Here are exposed some 350 ft. of gypseous marly clays and marly coquina beds. On the evidence of contained fossils, these beds have been correlated with the Apsheron (?) and Aktchagil Series (post-Productive) of Baku. At the locality studied, these Pliocene beds rest unconformably on Upper Cretaceous marine sediments. Elsewhere in northern Iran, the youngest marine beds are clays, limestones and sandstones of Eocene age, separated from the Cretaceous by a profund un-

| | Age | | Series | Thick. Feet | Description |
|---|---|---|---|---|---|
| QUAT. | Recent | | | 300 | Loess, swamp muck, beach sands & silts. |
| | Pleisto-cene | Ancient Caspian | | ? | Fine sands, silts, clays, etc. |
| | Unconformity | | | | |
| TERTIARY | Pliocene | Upper | Apsheron (?) Aktchagil | 0 to 360 | Reddish gypsiferous marly clays, limestone conglomerate, marl-coquina beds, green gypsiferous shale. |
| | Profound Unconformity | | | | |
| | Eocene | | | To 1500 | Conglomerates, sandstones, limestones, shales |
| | Unconformity | | | | |
| CRET. | Upper | | | To 1750 | Glauconitic sandstone, limestone, shales, red silts & sandstones. |
| | Middle | | | 3000 To 7500 | Silts, sandstones, limestones, calcareous sandstone, clay shales, chalky shales, etc.. |
| | Lower | | | 1500 To 4000 | Limestones, red to green shales, sandstones, conglomerate, etc. |
| | Unconformity | | | | |
| JURA. | Upper | | | 800 To 5000 | Shales, limestones, calcareous shales. Found principally in extreme northeast. |
| | Unconformity locally in northeast | | | | |
| | Lower | Lias | | To 3000 | Dark shales & sandstone. Continental in part. Muzduran Pass, northeast of Meshed. |
| | Profound Unconformity | | | | |
| PENNO CARB. | | | | To 4500 | Dense black almost vitreous limestones (bitumen), limestone interbedded with shales, sandstones, etc. |
| DEV. | | | | 1000 plus | Sandstones, shales, dense black limestone (bitumen) |

*Generalized section of Iran north of Elburz. (After Clapp[2])*



| Age | | | Series | Thick. Feet | Description |
|---|---|---|---|---|---|
| QUAT | Recent | | | 350 | Loess, gravel, clays, sands, etc. |
| | Pleistoc. | Ancient Caspian | | 400 | Conglomerate, sands, clays, shell limestone |
| Sharp Unconformity | | | | | |
| TERTIARY | Pliocene | Upper | Apsheron | 2000<br>400 | Limestone, coquina, sands, ash, clays.<br>Clays & marls. |
| | | | Aktchagil | 200 | Black clay, calcareous clay, sands, ash, marls, limestone.<br>Petroliferous sands - Surakhany |
| | | | Productive Series | 4000 | Sands, clays, sandstones, etc. (Continental in middle subdivision)<br>Many petroliferous sands throughout — Chief producing horizons. |
| | | Sharp Unconformity | | | |
| | | Pontian ? | Upper | 150 | Dark gray clays, siliceous marls, detrital limestone. |
| | | | Middle | 100 | Dark gray clays, striped clays interbedded with siliceous marls |
| | | | Lower | 650 | Dark gray shaley clay. |
| | Sharp Unconformity | | | | |
| | Miocene | Upper | Diatom Beds | 1300 | Clays, silts, marls, etc.<br>Petroliferous in a few localities. |
| | | Middle | | | |
| | | Lower | Maikop | 1000 | Chocolate brown clays, yellow ochrous formation.<br>Bituminous in a few localities. |
| | Oligocene | | Kown | 2000 | Clays, marls interbedded with sandstone, some intercallated bituminous shale.<br>Local indications of bitumen throughout. |
| | Eocene | Flysch Form. | Sumgait | 300 | Red-brown clays, thin beds gray limestone. |
| | | | Likhidag | 1000 | Dark gray-green clays intercallated with coarse gray-brown sandstone. |
| | | | Yunusdag | 630 | Red-brown fucoidal clays & marls interbedded with glauconitic sandstone. |
| Sharp Unconformity | | | | | |
| CRETACEOUS | Upper | Maestrich | | 2000 | Marls, brecciated limestone, etc. |
| | | | | 1500 | Green & red marls, clays, white marly limestone grading to conglomerate. |
| | | | | 750 | Calcareous sandstones, brecciated limestones, dark clays. |
| | | Cenoman. | | 1500 | Brown & gray clays, sandstones, Conglomerate at base. |
| | Lower | Aptian | | 1600 | Red & brown marly clays, intercallated sandstones, conglomerate at base. |
| | | Barrem. | | 2000 | Gray-brown laminated clays, intercallated gray marls and marly sandstone. |
| | | Neocom. | Shah Dag | ? | Compact calcareous sandstone, massive beds of dolomite. |
| JURA | Upper | | | 1500 | Largely black argillaceous shale, some sandstone, some gypseous beds. |
| | Middle | | | | |
| | Lower | Lias | | | |

***Generalized section of the Baku district. (After Goubkin[4])***

conformity. What may happen under the loess-covered plains bordering the Caspian is anybody's guess.

In many places in northern Iran, the black Devonian and Carboniferous limestones emit a strong odor of petroleum on fresh fracture. But, wherever observed, these rocks have been so indurated and nonporous that it is doubtful if they could offer avenues of egress or migration for any entrained bituminous matter. Jurassic production has been reported from localities farther east, in Central Asia. Complete and authoritative information has not been obtainable. From such scattered reports as have come out, it would appear that this production has been small, short-lived and generally disappointing. The prospects for Jurassic production in Iran itself are conjectural. Many large anticlines which probably involve Jurassic strata are reflected in Lower and Middle Cretaceous beds. In almost all cases, however, these structures are cut off by transverse faults.

Another significant fact which bears on the oil possibilities of northern Iran is the absence of seepages. From time to time shows of petroleum have been reported, principally in the provinces bordering the Caspian Sea. Many of the localities were visited by the writer, but in only three cases were such occurrences verified. Those were of such tiny proportions that they could hardly be described as a trickle. The absence of seepages alone cannot be taken as condemning the entire area. But, in a region where faulting is of the frequency and magnitude one finds in northern Iran, it is only reasonable to expect a few copious seepages comparable with those of the Zagros foothills or those of Baku.

At the risk of exceeding the scope of the present article, it seems only fitting to conclude with a word or two on the political and economic aspects of the situation. We have seen from the foregoing brief account that in the case of Iranian oil fields we are dealing with two major areas, one proved and well developed, the other highly speculative. The two petroliferous zones lie in utterly dissimilar geological provinces separated by some hundreds of miles of relatively unattractive country. They also lie in separate and distinct spheres of political interest, which antedate by many decades the discovery of commercial oil deposits. Thus far, there has been no direct indication on the part of Russia of any desire to usurp the British oil rights in southwestern Iran. Similarly, British and American oil interests generally concede that, for their part, the northern provinces are better left alone. This complementary view is based on sound reasoning quite apart from any political factors. When one considers the enormous distances involved and the difficult terrain which must be conquered, especially in the light of the present world production and marketing position, it would be uneconomic to transport large quantities of Persian Gulf oil to the Caspian or vice versa. On the other hand, the development of new oil fields in northern Iran would be a welcome addition to Russia's supply, and one which would fit in well with her existing internal system of distribution. Whatever international rivalries exist over the Iranian question, they would not appear to be based on oil.

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# Waste Disposal, Water Treating Highlight W.P.R.A. Meeting

*by R. B. Tuttle*

LANSING, Mich. — Discussion following the presentation of prepared papers at the regional technical meeting of the Western Petroleum Refiners Association held here June 20, revealed the wide interest in waste disposal and water treating. R. W. Kelly, Tulsa, of Dearborn Chemical Co., and L. C. Burroughs, Shell Oil Co., Inc., presented two papers at the meeting which was attended by refinery engineers and operators of the Michigan area and members of the Michigan State Conservation Department.

In discussing water treating problems, Kelly said, "Any approach to a water treating problem will only be as successful as the degree of control kept on it." He emphasized the importance of adequate control in the prevention of boiler explosions and illustrated, with slides, the damage caused by exploded boilers, explosions are said to have resulted from lack of water-conditioning control. Kelly also pointed out the importance of internal treatment of boiler feed water in his statement that such "is generally necessary in boilers whether or not an external softener is used."

Zeolite water softeners have the advantage of requiring very little attention or control, Kelly indicated; they have the disadvantage that higher alkalinity may be produced in water systems having high carbonate content. Some treatment is necessary for lime-soda softened water, because of encrusting solids dissolved therein, Kelly said. Water softened by zeolite treatment must normally be treated to prevent caustic embrittlement resulting from its use. The most generally satisfactory method for preventing caustic embrittlement is the recently developed method of treating with soluble nitrates.

Continuous blow-down of boilers is highly advantageous, Kelly stated. In the southwest oil country, he said, 75 per cent of the boilers are equipped with continuous blow-down systems, which have been estimated to save 50 per cent of the amount of water so wasted and still maintain good boiler conditions. Once acquainted with the advantages of continuous blow-down the operator will never dispense with that method, Kelly believes. The use of Langolier's Equations permits accurate predictions of scale formation propensities provided the alkalinity, dissolved solids, pH, calcium content, and temperature of operation are known. Some refinery conditions limit the usefulness of these equations, such as the case where skin temperatures on tubes are much higher than average water temperatures; under these conditions the water may pick up scale-forming materials by corrosion at points of low temperature and deposit these materials at high-temperature points.

One of the problems of zeolite softening of cooling water is the dezincification of brass fittings, Kelly said. High alkalinity will delignify the wood in a cooling tower, causing final disintegration of the tower units. The presence of algae may reduce both air and water circulation to point where damage is done. Chlorine is effective but is lost by aeration of the water. The most recent treatment is sodium pentachlorphenate, and slug or intermittent treatment is used and is preferably to continuous treatment, during which the algae tend to develop an immunity to the algaecide.

### Separator Designs

L. C. Burroughs, Shell Oil Co., Inc., in a well-organized paper, covered the wide field of waste disposal adequately as was shown in the open discussion following its formal presentation. Slides were employed to illustrate the separator designs developed by American Petroleum Institute's waste disposal committee and photographs showing the details of a unit constructed according to A.P.I. specifications were passed out for study. In discussing separators Burroughs said that "experience has shown that as a general rule the best results are obtained when small separators are installed in the various departments of the refinery to handle the individual wastes rather than to allow them to combine before entering the separator system."

"Chemical wastes cannot be removed economically from waste water once it has been allowed to enter it," said Burroughs. Numerous plant scale tests, according to Burroughs, have shown that oil separation is best where the waste water is maintained neutral or slightly acid. Certain compounds such as naphthenates, phenolates, and mercaptides which are contained frequently in lime and spent caustic slurries used in treating petroleum products are excellent emulsion stabilizers and when allowed to enter the separator as such interfere with its operation. Burroughs' paper also dealt with problems concerning obnoxious and toxic gas disposal. The recommendation given for handling such problems could be reduced in general to a matter of burning the materials in a properly designed furnace.

Emulsions from traps and separators may be broken most economically by pumping into tanks equipped with heating coils and heated to about 180° F. for several hours, drawing off the good oil which separates on top. Sodium sulfide, spent caustic, or dilute acid may be used to hasten and increase the degree of separation. The most common lubricating oil emulsions are the so-called "white water" type, formed by neutralizing acid-treated lubricating-oil fractions with caustic soda or soda ash. These are treated with calcium chloride or sodium chloride solutions, may be heated, and the oil returned for retreatment after the separation, Burroughs said. Spent caustic may be disposed of in small amounts only, by dumping into the refinery sewer; by storing in ponds as a temporary measure; or by neutralization with waste acid or flue gases. All such methods must be chosen to fit the specific situation in each case.

This meeting was the first of a series scheduled for the Michigan and other northern areas, according to announcement by John C. Day, W.P.R.A. secretary.

## Gas Association Seeks Steel for Pipe Lines

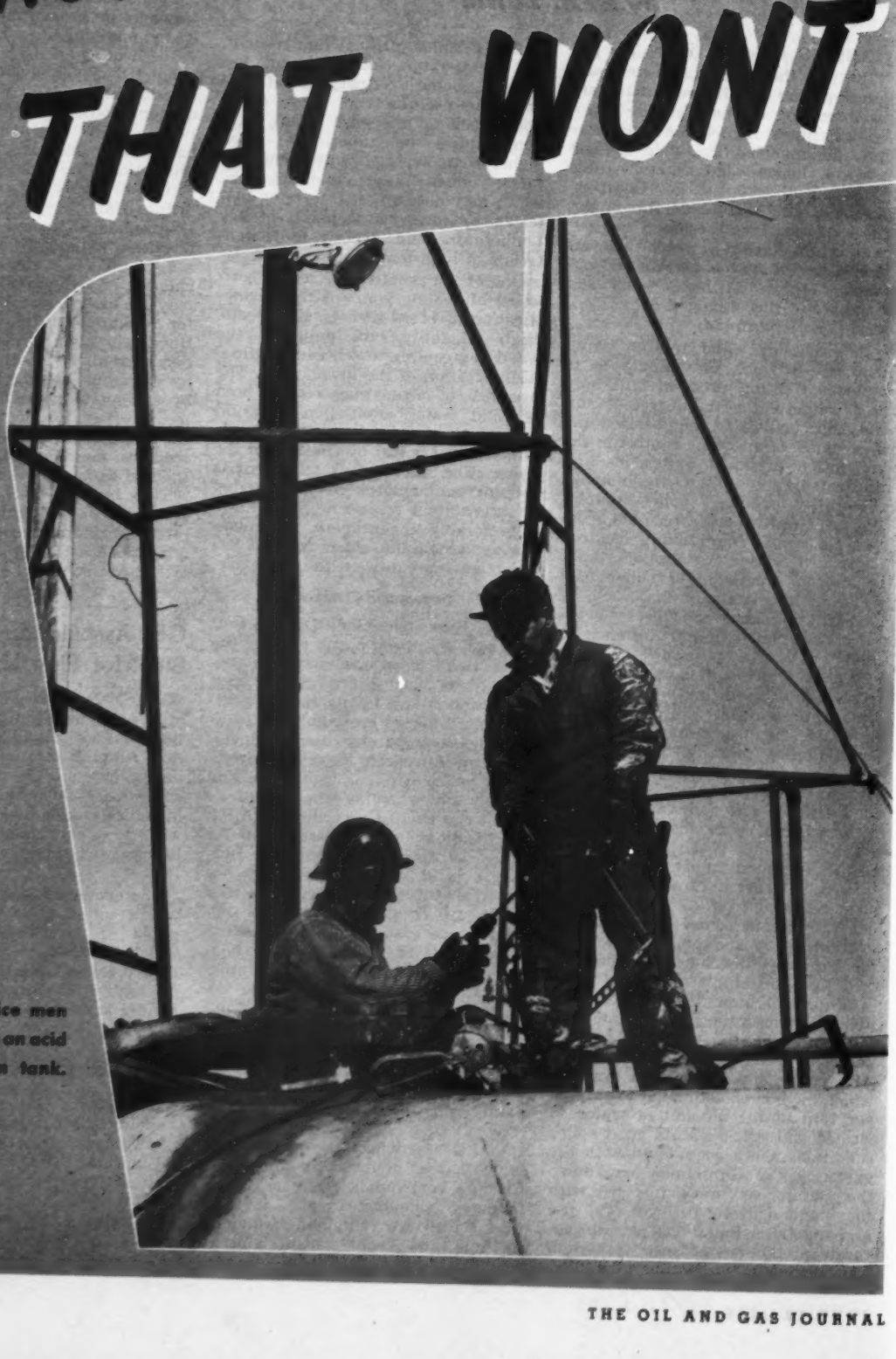
WASHINGTON.—E. Buddrus, head of Independent Natural Gas Association, last week told Civilian Production Administrator J. D. Small that unless more steel is allocated for pipe, companies which already have permits for gas pipe lines from the southwest to other areas will be unable to construct these lines until 1947 or 1948.

The committee from the association which called upon Small was composed of Joseph Bowes, president, Oklahoma Natural Gas Co.; B. R. Bay, president, Northern Natural Gas Co., and E. Buddrus, president, Panhandle Eastern Pipe Line Co.

## Imperial Orders Tankers

TORONTO, Ont.—Imperial Oil has announced a contract for construction of two canal-size oil tankers has been let to Collingwood Shipyards, Ltd., for $1,570,000. Deliveries are to be made in May 1947. The ships, each of 2,500 deadweight tons, are the first vessels in the company's postwar shipbuilding program.

# ANOTHER ACCIDENT THAT WON'T



UOP service men inspecting an acid blowdown tank.

# WASHINGTON WATCHING

BY HENRY D. RALPH

## Obstacles to the Oil Council

WASHINGTON.—The National Petroleum Council may not be a complete bust, but it is starting out under a string of handicaps which don't augur well for an early and glorious success.

In the first place, a good many members of the council don't see much need for the organization, and privately some of them are quite cool or even downright hostile to the whole idea.

The antitrust law hangs like a sword of Damocles over the whole procedure. Some members feel that the attorney general's letter gives them immunity from prosecution as long as the council never does anything. Others that even if the council does nothing it might run afoul of the Sherman Act. Still others want the Justice Department to loosen up a bit so the council can do a few things which otherwise might have a suspicion of illegality.

The secrecy which surrounded the meeting increases the suspicion that all did not go smoothly at the first session. So does the fact that nothing was done except to appoint a temporary chairman with the power to appoint a temporary committee to make tentative suggestions as to what, if anything, should be done next.

### Functions Circumscribed

Developments at the Capitol last week greatly circumscribed the functions of the council and the new Oil and Gas Division to which it is attached. Members of the Senate committee on petroleum resources made it plain that neither OGD nor NPC have power to do anything except make suggestions.

Inspite of protestations of top officials, many council members are suspicious of the Government. They are willing to go along with their old friend, Ralph Davies, in helping to start off the new Oil and Gas Division, but Davies says he will not be with the Government very long. They seem much impressed with the frankness of the secretary of the interior and are willing to believe that he is less ready than they suspect his predecessr was to slip over some sort of federal control of the industry. They realize that an act of Congress is required to institute new controls. Nevertheless suspicion of the Government persists.

The relatively small attendance at the organization meeting—53 out of 85—was not a very good sign either, though many of the absences were due to Davis' unexplained delay in holding up appointments and announcement of the date until 3 days before the meeting.

## Unsettled Antitrust Problems

THE antitrust "clearance" given the National Petroleum Council by the Department of Justice failed to please all members of the council. Apparently it didn't please Davies either, for he refused to make it public until he got the members together in a closed room, although the attorney-general's letter was dated May 27.

However, it is hard to understand why anyone should have expected anything different in view of the wording of the Sherman act and the history of antitrust enforcement. As one oil industry attorney expressed it: "The letter is ample assurance if the council isn't going to do anything illegal; if it intends to restrain competition then no promise of immunity is any good."

The department's letter follows the same pattern as the wartime letters it sent to the War Production Board and other agencies regarding industry advisory committees. It adheres to these fundamental rules: Any industry group may consult with and advise any government agency; an industry group may not fix government policies nor assume government duties and responsibilities; the fact that industry members are meeting under government auspices does not give them authority to do things that would be illegal if done in a private meeting.

### Certification Procedure

Apparently what irks the council members is the omission of machinery for certification of programs, such as was done during the war. Under that procedure the petroleum administrator, WPB chairman, or other government official, would draw up a plan of industry regulation or activity under which industry committees would be delegated, in effect, certain governmental war powers, and the attorney-general would grant specific approval of the plan.

This certification procedure was used only where the program was drafted and policed by a government agency and declared by it to be necessary to the war, and where the program would patently be in violation of the antitrust laws. Its only counterparts in peacetime were the NRA codes, which the Supreme Court held to be unconstitutional, and the ineffectual "trade practice conference" procedure which the Federal Trade Commission attempted with poor results back in the 20's.

If the NPC wants power to regulate the oil industry and do things which the Sherman act says are illegal it will have to go to Congress for a new law. The Department of Justice has no authority to grant immunity.

## Secrecy Shrouds Meeting

THE most ill-starred and suspicious feature of the National Petroleum Council is the secrecy Davies has thrown around it. Davies' entire governmental experience was during wartime, and in dealing with military secrets. Then there were valid reasons for secret meetings and reports of the Petroleum Industry War Council and its committees. Now there are none. On the contrary, there is every reason why the NPC meetings should be held in public.

The antitrust angle alone should be enough to force open meetings. All that the public knows is that threescore oil industry executives met behind closed doors and discussed regulation of the industry.

Nevertheless, the council meeting was held as a star-chamber proceeding. Following the meeting Davies talked briefly with the press and said that they didn't miss much because nothing of much importance was said during the all-day session. Meanwhile various members of the council are telling diverse versions of what happened.

## Antitrust Negotiations

NEGOTIATIONS for a consent-decree settlement of the "Mother Hubbard" antitrust suit against the American Petroleum Institute and 21 major oil companies appear to have ended. The negotiating committee of defendants' attorneys met recently with top executives of the 21 companies and reportedly agreed that they could not consent to the type of decree which the Justice Department is insisting upon and it was decided to fight the case out in court.

Justice officials claim they have not been officially notified that negotiations have ended but they are continuing routine preparations for the trial. Time for filing answers to the 6-year-old complaint is now set for July 22, but this does not mean immediate trial. Defendants probably will move for dismissal — usually a futile gesture in this type of case— and then for a bill of particulars— which will involve arguments on the motion. In this event Justice quite likely will drop the old complaint and file a new one, a procedure probably simpler than making the many amendments required to bring the old complaint up to date. Many other legal maneuvers could delay actual trial, and consent decree negotiations could be resumed at any time.

### *Parten Offered Post*

PRESIDENT TRUMAN has offered J. R. Parten, president of Premier Oil & Refining Co. of Houston, the post of chairman of the Council of Economic Advisers to administer the so-called fuel-employment act. As yet Parten has not decided whether or not to take the job, and his decision may rest in large part on whom the President selects for the other two advisers on the council.

Parten was director of the transportation division of PAW which directed construction of the big-inch and other pipe-line projects. He also served with the old NRA and more recently has been on the reparations commission under Edwin W. Pauley.

### *Senatorial Views*

SENATORS Moore of Oklahoma and O'Mahoney of Wyoming appear to have put the Oil and Gas Division into a box as a result of the hearing their petroleum resources committee held last week.

A couple of days after the hearing at which Acting Director Davies disclaimed that OGD sought any extraordinary powers, the Senate took up the Interior Department appropriation bill. When it reached the amendment carrying $236,000 for OGD in addition to the $216,000 already provided for administration of the Connally "Hot Oil" Act, Moore almost succeeded in killing the whole thing.

O'Mahoney defended the appropriation, but in a way which should give Davies little comfort. He said the entire purpose was to make a study of federal petroleum activities with a view to drafting a reorganization plan which will be submitted to Congress later. Moore had complained about the secrecy surrounding OGD, but O'Mahoney countered by saying that under the procedure Davies had agreed to at the hearing, all proposed changes and reorganizations will be discussed by appropriate committees of Congress before a formal reorganization order is drafted.

Senator Hayden of Arizona, in charge of the department's bill, also tried to assuage Moore's fears about OGD, and he didn't help Davies much either. He said it was distinctly understood by the appropriations committee that OGD is only temporary and that funds will be provided for only 1 year. He substantiated O'Mahoney's view that the only purpose of OGD is to draft a plan for reorganizing and coordinating federal oil and gas activities and to submit a program to Congress.

## Texas, Magnolia Plan New Products Pipe Line

HOUSTON.—Announcement was made this week by Texas Pipe Line Co. and Magnolia Pipe Line Co. of plans for a new products pipe line system to be laid from the Gulf Coast district of Texas to the Fort Worth and Dallas and the Austin and San Antonio areas of inland Texas. Preliminary surveys for the right-of-way will be started within the next few weeks. Actual construction is not expected to get under way before the early part of 1947 because of delays in obtaining pipe.

Magnolia Pipe Line Co. will lay and operate that portion of the system originating at a point south of Beaumont near the Spindletop oil field, and extending to a central terminal at Hearne, Tex., a distance of approximately 180 miles. This line will be constructed of 10-in. pipe. The proposed route will extend eastward from the Beaumont terminal to a point near Aldine, about 10 miles north of Houston, a distance of about 80 miles, and thence northward to Hearne.

From the Hearne terminal, Texas Pipe Line Co. will lay and operate two lines. One, a 10-in. line, will extend northward by way of Waco to a terminal west of Grand Prairie, between Fort Worth and Dallas, a distance of approximately 135 miles. The other will extend southwestward to Austin and San Antonio. That portion to Austin, a distance of 80 miles, will be 8-in. The 80-mile extension to San Antonio will be 6-in.

The proposed route northward from Houston to the Dallas-Fort Worth area will roughly parallel within a distance of one to two miles the right-of-way of the new 8-in. products line being laid by Humble Oil & Refining Co. from its Baytown refinery to the inland Texas cities.

The system will be operated as a common carrier and thus will serve any refineries and marketing companies in either the Beaumont-Port Arthur or Houston-Texas City areas which desire it and have market outlets at delivery points on the system. Immediate plans call for Magnolia Pipe Line Co. laying feeders to the Beaumont terminal from Magnolia Petroleum Co.'s Beaumont refinery, located nearby, and from The Texas Co.'s refinery at Port Arthur, 10 miles south.

## Oklahoma, Texas Shelve Electric-Log Proposals

A PROPOSAL by the Oklahoma Corporation Commission that any electric logs made, in addition to present filing of driller's logs, on oil and gas wells, be filed with the commission within 90 days following completion of the well, met opposition from oil companies and operators at a hearing in Oklahoma City this week.

Ruling on the proposal was delayed, but both conservation officers and oil companies agreed on revisions to bring up to date present regulations covering drilling, production, and the making of reports to the commission.

Conservation officers and some independent operators fought for the filing provision, and letters were introduced as evidence to show that such information would aid the state's conservation program.

#### Protest in Texas

In Texas, the state Railroad Commission dropped a somewhat similar proposal after it met with a storm of protest. The electric logging proposal before the Texas commission would have required logs to be run on all completions and filed with the commission. The Railroad Commission now requires logs to be filed in the case of special completions or those from more than one pay zone.

At the Oklahoma City hearing, Ben O. Howard, commission geologist, testified that Oklahoma operators were not adhering to the law requiring filing logs and that new rules should be adopted to compel them to file complete logs revealing sample information obtained in drilling. Such data, he felt, belongs to the state and would help the state to expand its oil and gas resources.

While some of the major companies said that it was unfair for them to spend considerable sums in obtaining geological information via electric logs or other methods and then pass it on to operators in general, Howard argued that purpose of the Oklahoma commission's regulations was to have an accurate log that would allow other operators to explore for oil and gas resources the larger concerns may have missed.

# Uncertainties of Control Picture Disturbing Influence on Prices

*by Dahl M. Duff*

THE widespread belief that petroleum and its products will be freed of price control July 1, continued to exert an increasingly disturbing influence on oil markets this week.

Offerings on the spot market were generally described as scarce to nonexistent in the face of the possibility that the industry will be decontrolled. Where possible, suppliers appeared to be willing to wait for developments in the price picture next week in Washington.

Early this week, hopes for immediate decontrol were dimmed by action of the Senate-House conference committee in eliminating from the OPA extension bill the provision which would have forced removal of controls on oil and several other commodities June 30.

Despite this unfavorable development, the conference committee's bill contained several provisions sharply curbing OPA's power. It specified a general decontrol policy calling for removal of ceilings as soon as supply comes in approximate balance with demand. That this condition exists in petroleum has been a keystone argument of the oil industry. Another provision of the conference measure provided a decontrol board independent of OPA which could override the agency and order decontrol. Oil industry officials generally fail to see any likelihood of immediate relief with a prolonged investigation by an appeals board.

Generally predicted in the event of decontrol was a rise of possibly 25 cents a barrel in crude, followed later by increases ranging up to ½ cent in motor fuel, at least during the present season of peak demand. Some observers doubted any marked rise in other products until the seasonal trends are reversed next autumn.

Uncertainty over the price situation, coupled with continued heavy consumption, held sales of gasoline at or near ceiling last week. By the end of the week, nearly all gasoline was expected to be moving at the 6-cent ceiling in the Group 3 area.

Another significant development in oil markets last week was the action of the Interstate Commerce Commission in authorizing an emergency railroad freight-rate increase of 6 per cent. The new rates, effective July 1 on 3 days' notice, are much the same as the emergency freight rate increases authorized in March 1942, and suspended by the commission July 1, 1944.

The new rates, as they affect the oil industry, will widen the so-called pipe line territory, or the area which can be more economically served by pipe line under existing differentials.

Although the oil industry unlike many others has a competing method of transportation in the pipe lines, nevertheless, the railroad rate increase will mean higher costs since most products other than motor fuel move by tank car.

One Mid-Continent marketer this week reported some easing of consumer demand for premium-grade gasoline. He pointed out that the drop in octane rating for premium has been greater than for housebrand and said some consumers appear to feel that the present spread between octane of housebrand and premium is not "a 2-cent a gallon difference." Top octane for premium is now 78.5 under a Civilian Production Administration order issued as a result of the severe lead shortage. Housebrand octane ranges upward from 73 and 73½.

Some slight improvement in the supply of residual was reported last week. Railroads, which generally pay $1.05 a barrel under contracts for the product, were reported finding it unnecessary to buy as much "off-the-line" material to supplement contract purchases as formerly.

Reports on the situation of kerosene in the Mid-Continent area varied. One marketer said some of the product was being offered as much as ⅝ cent under the posted market by small refiners with no large storage. Another buyer said kerosene is still tight. Some refiners, he said, are buying kerosene in the open market to meet their commitments and taking a greater cut in their own production to increase yields of No. 1 burning oils which they are storing in anticipation of even heavier demand next winter.

From New York came reports that residual, No. 2 burning oil and kerosene are "extremely tight" with nearly all suppliers holding material in expectation of higher prices after June 30. East Coast gasoline demand was continuing to rise. Several refiners were bidding for more gasoline in the New York market.

# DEATHS

**Art L. Walker,** died at Oklahoma City June 22. Walker was Oklahoma's first conservation officer and first secretary of the Interstate Oil Compact Commission.

**Charles L. McMahon,** 70, pioneer independent oil operator, died June 23 at his home in Tulsa. McMahon began his oil career with South Penn Oil Co. in West Virginia, in a clerical capacity. He came to Oklahoma, then Indian Territory, in 1905 to represent Barnsdall interests. In 1913 he organized C. L. McMahon, Inc., in Okmulgee, Okla., which was moved to Tulsa in 1926. The company has holdings throughout the Mid-Continent.

**A. L. Meeks, 75,** associated with S. M. Jones Sucker Rod Co. until his retirement about 4 years ago, died June 20 in Tulsa.

**Marcus C. Hullings,** 73, early-day Oklahoma drilling contractor, died June 20 in Tulsa.

**Dennis L. Boals,** 77, driller of the discovery well of Kemp-Munger-Allen, Wichita Falls, Tex., died June 19 at Monahans, Tex. Boals was a native of Oil City, Pa.

**William A. Townsend,** 65, formerly manager of the process products division of Socony-Vacuum Oil Co., Inc., died June 17 at Skaneateles, N. Y.

**Louis A. McCaghren,** 43, died June 20 in Houston. McCaghren was an independent drilling contractor in South Texas fields.

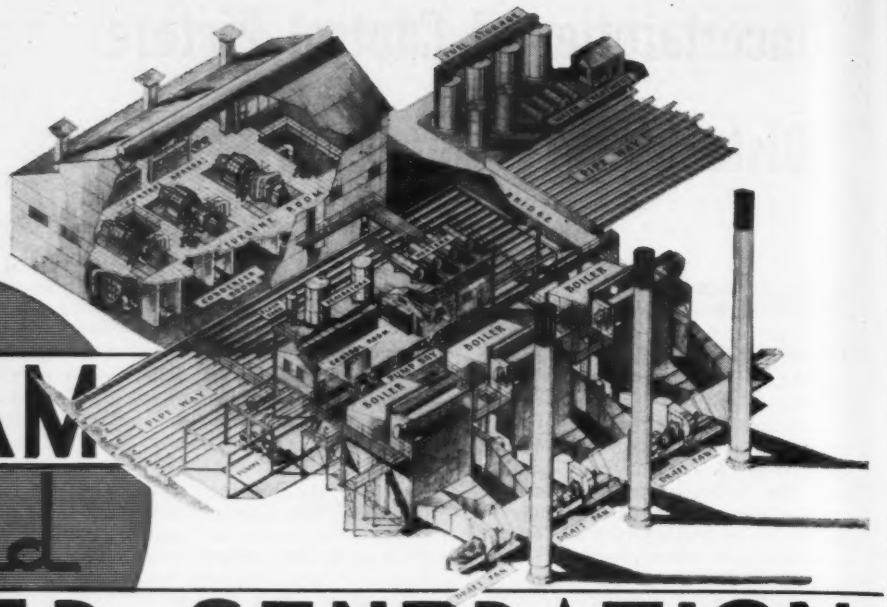
**David Heggie,** 64, retired vice president and director of Shell Oil Co., Inc., died June 8 in Berkeley, Calif. Heggie, with 35 years of service with Shell, held the company's longest continuous work record.

**John Oscar Dart,** 80, Midwest, Wyo., former superintendent for Stanolind Oil & Gas Co., died recently.

**E. L. Smith,** 60, Dallas independent operator and former president of the Mid-Continent Oil and Gas Association, died June 24 in Dallas after he was stricken while attending a dinner with several American Petroleum Institute directors who are meeting in Dallas. Smith was a former president of the Texas Petroleum Council and the East Texas Chamber of Commerce and a former A.P.I. director.

**J. C. Taylor,** 46, vice president in charge of sales of Ethyl Corp., died suddenly from a heart attack at his home in New York City June 25. He had been connected with the Ethyl organization for approximately 20 years.

by
**William F. Ryan**



# STEAM and POWER GENERATION

PART 1

## *In the American Refinery*

WE are accustomed to think of the petroleum industry as standing in the forefront of technological development, but, so far, this leadership is lacking in the field of power generation. Except for some outstanding work in the field of feed-water treatment, the best of existing refinery power plants are only timidly imitative of public-utility practice, contributing nothing new to the art of power generation, and devoid of much creative engineering adapted to the special conditions encountered in refinery practice. This is all the more remarkable in view of the fact that it was largely the metallurgical developments for refinery processes that accelerated the commercial development of high-pressure and high-temperature steam-generating equipment which is now the foundation of efficiency in steam-electric power generation, both in public-utility and in industrial plants.

Several modern refinery power plants are notable for the excellence of structural and mechanical design. Moreover, there is nothing to be criticized regarding their thermal efficiency. Some of these plants convert as much as 80 per cent of the heat supplied in the fuel into useful energy, delivered to the refinery as electric power and process steam. The refinery power plant, however, can not be judged on the basis of thermal efficiency. In this respect, it presents an entirely different problem from the public utility's central station, and must be designed on a different basis. Objective of the designer of a refinery power plant should be to achieve a high yield of electric power from the amount of process steam which the process consumes. It is in this that the existing installations are most disappointing.

High steam pressure and high steam temperature yield vastly greater returns in the refinery than in the public-utility plant, but not a single refinery installation takes more than casual advantage of these possibilities. Although central power stations have been using 1,200-psi. steam for power generation since 1925, it was not until 1945 that any refiner purchased boilers for an equally high operating pressure. This installation, which is scheduled for completion in 1947, will also be the first refinery plant to use a steam temperature as high as 900° F., whereas public utilities have been using temperatures of 900° to 950° F. since 1936. Incidentally, one public utility had completed three plants as early as 1941, to supply steam and power to refineries, using pressure and temperature of this order.

### Growing Demand for Electric Power

The oil refineries should be leading the world in many phases of technological development for the generation of steam-electric power. Few other industries have as favorable conditions for low cost of production and none is better equipped from an engineering, operating, and financial point of view to make more efficient use of these conditions. It is true the need for large quantities of cheap power is a comparatively recent development in the petroleum field, and this, no doubt, explains the relative backwardness of refinery-power-plant engineering in the past, but the growth of the chemical industry as an adjunct of petroleum refining has created entirely new conditions.

Oil refineries have always been heavy consumers of steam. With modern development in refining processes, they became moderately heavy consumers of electric power as well, and the recent tendency to combine chemical manufacture with refinery operations has tremendously increased the demand for both utilities. Refineries with steam demands exceeding 1,000,000 lb. per hour, and electric power demands exceeding 25,000 kw., are now commonplace. For some chemical processes, the availability of low-cost power from the refinery is only less important than the petroleum byproducts which provide the raw materials, and the combined petroleum-chemical opera-

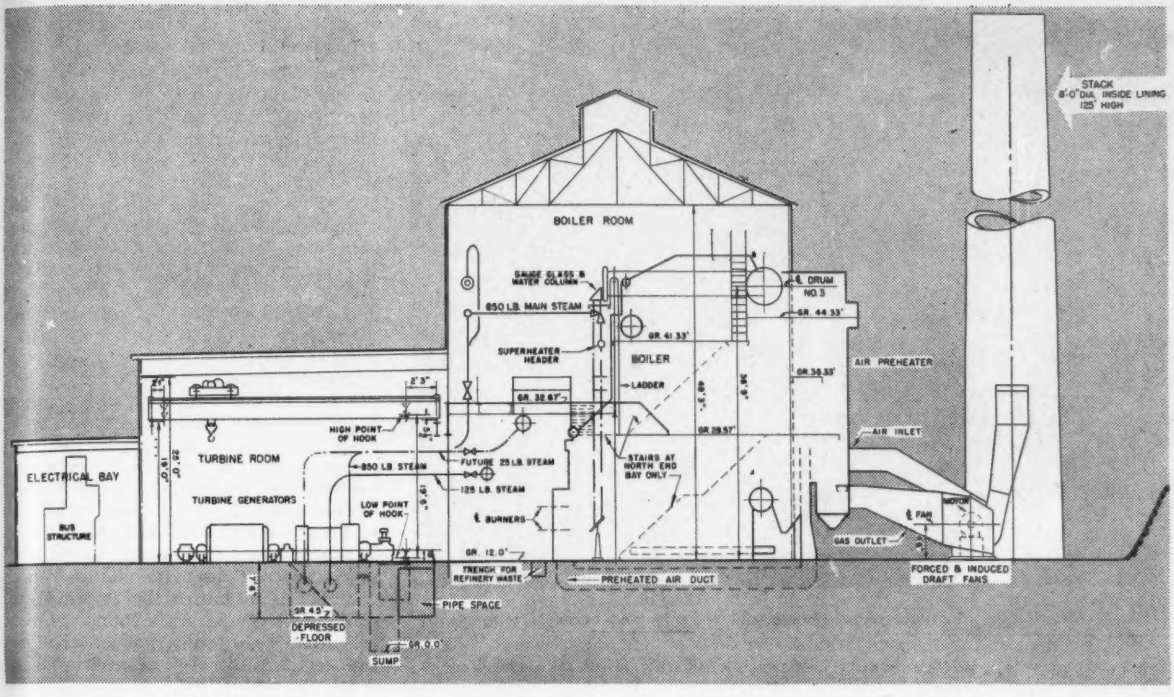



*Fig. 1—Cross-section of Richmond refinery power plant*

tion can as ill afford to waste the potential "byproduct" power from its process steam supply as to neglect the recovery of olefins from the gas stream.

### Early History

In the earliest refineries, the supply of waste fuel often exceeded the demand, and in any event, fuel was cheap. The byproduct generation of power has also been practised from the earliest days; that is, steam required for distillation or heating was first passed through steam turbines or engines driving electric generators, compressors, and pumps. In the days when power demand was low in proportion to the steam requirements, an operating steam pressure of 150 to 200 psi. was adequate to generate a refinery's total power consumption with prime movers exhausting at 5 to 100 psig. It was a popular fallacy that this type of generation was "100 per cent efficient" and that water rates of prime movers meant nothing. Even when exhaust steam was wasted to the atmosphere, if the fuel was "free" or very cheap, it caused little concern. As a result, the refinery power plant became a symbol of inefficiency in the minds of power engineers in other industries; it was considered a near relation of the "oil-field boiler" of ill repute.

As the waste fuels diminished in quantity, or became marketable, and as the demand for electric power increased, more attention was given to efficiency and "heat balance": that is, an effort was made to prevent the supply of exhaust steam from prime movers from exceeding the process demand. This required higher steam pressure, more efficient prime movers, or both. In spite of these rapidly changing conditions, we find no published record of any American refinery which had installed steam power generating equipment operating at a pressure above 275 psi. before 1925. At that time, the majority of public-utility plants were designed for about 400 psi. and 700° F., but four higher-pressure installations were completed during that year, three for operation at 600 psi. and one at 1,200 psi., all at 750° F.

### Progress of Higher Steam Pressures

The arbitrary figure of 500 psi. has been generally considered the dividing line between high-pressure and low-pressure steam. Use of high steam pressures developed rapidly in the utility field and it was immediately recognized that whatever value high pressures might have in central stations, this value was


**THE AUTHOR**

**The author is assistant engineering manager, Stone & Webster Engineering Corp., Boston. He received his A.B. and M.M.E. degrees from Harvard University in 1911 and 1913. Following 5 years with Interborough Rapid Transit Co. in New York on plant construction and operation, he became chief power-plant engineer for Wright-Martin Aircraft Corp., New Brunswick, N. J. For 5 years he was mechanical engineer for Harry M. Hope Engineering Corp. of Boston on design and operation of steam power plants. From 1924 to 1929 he was power and mechanical engineer for The Solvay Process Corp. and Atmospheric Nitrogen Corp., at Syracuse. At Syracuse he designed the country's pioneer high-pressure industrial power plant and was responsible for the mechanical design of the great nitrogen-fixation plant at Hopewell, Va. Since 1929 he has been associated with his present company, devoting his time chiefly to steam-power generation and chemical-plant design, particularly chemical plants involving utilization of high pressures and high temperatures. He is a fellow of A.S.M.E., first vice president of Harvard Engineering Society, and president of Massachusetts Society of Professional Engineers.**


**This is the first of a series of articles in which Ryan will discuss many phases of refinery power plants.**

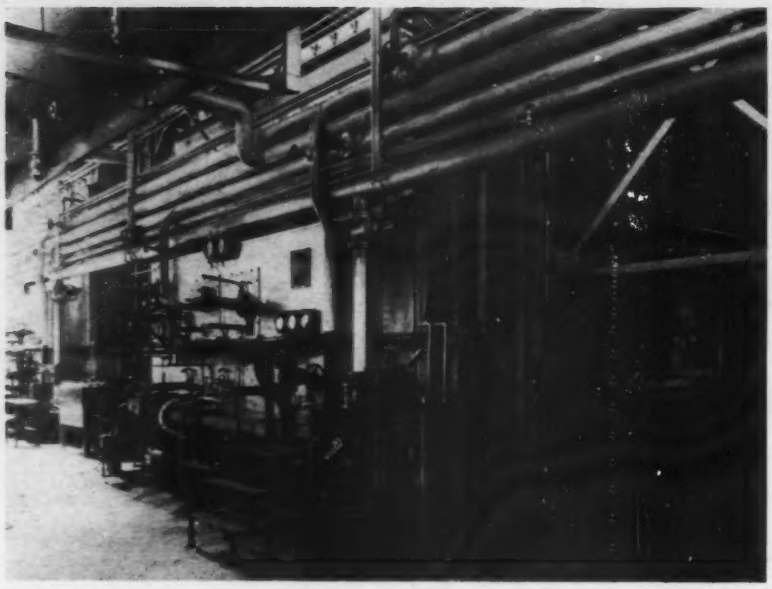


*Fig. 2—Firing aisle, Richmond plant, showing boiler fronts and burner arrangement*

greatly augmented in the industrial plant producing byproduct power from process steam.[2] In a central station, with turbines using steam at 750° F., which was considered the highest practical temperature in 1925, and exhausting at an absolute pressure of 1 in. Hg, the energy theoretically available from the steam is increased less than 7 per cent by increasing the throttle pressure from 400 to 1,200 psig. For an industrial-plant turbine, exhausting to process mains at 150 psig., the corresponding gain in available energy is 44 per cent. Practically, the advantage of the back-pressure turbine over the condensing unit, resulting from higher pressure, is even greater than theoretically.

### First High-Pressure Installation

The first "high pressure" industrial power plant was placed in operation in 1927. This plant was designed for 900 psi., 750° F. Twelve years later, there were at least 85 industrial power plants in this high-pressure classification, 8 of which were refinery installations.[3]

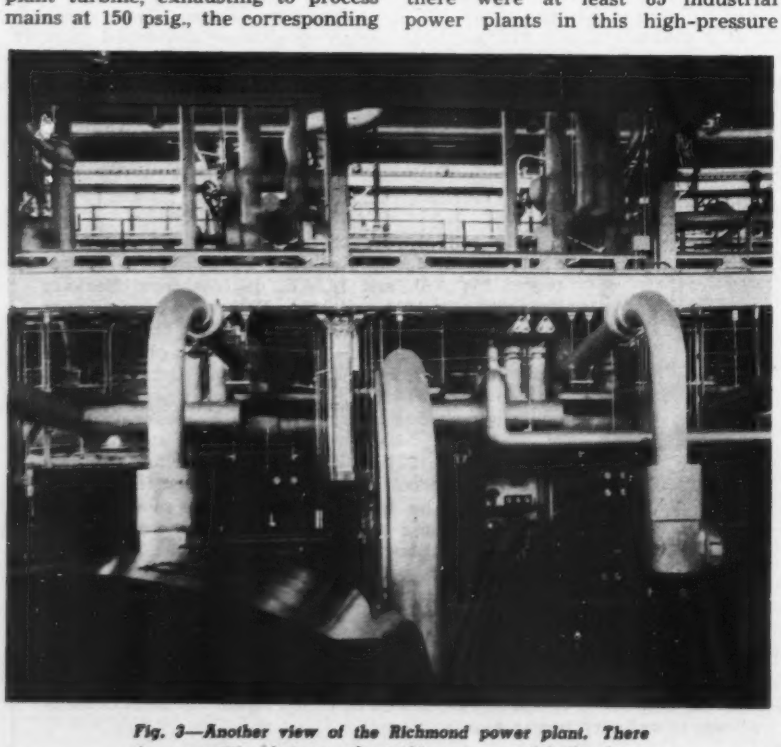


*Fig. 3—Another view of the Richmond power plant. There is no partition between the turbine room and boiler house*

The first high-pressure refinery power plant was built in 1929, and it barely made the grade of this arbitrary classification, being designed for operation at 525 psi., steam pressure. This plant, installed by Gulf Oil Corp. at Port Arthur in 1929 contained one 10,000-kw. turbine generator. At that time 750° F. steam temperature was common in public-utility practice but this plant was designed for 635° F. at the turbine throttle. The use of low steam temperature is still characteristic of nearly all refinery power plants. This practice arises from a desire to produce exhaust or extracted steam at a predetermined superheat, to suit old prime movers or to suit process requirements. Actually, the exhaust temperature from a back-pressure turbine varies with the load, and a much higher yield of byproduct power, as well as better temperature control, is obtained by exhausting at a higher temperature than required for process use, and then controlling the temperature by desuperheating.

The single generating unit at Port Arthur was supplied by three boilers having a total capacity of 415,000 lb. per hour. It exhausted to the refinery mains at 125 to 150 psi. A high-pressure heater using exhaust steam at 125 to 150 psi. increased the throughput of the turbine, and so increased the yield of byproduct power, but otherwise it was the simplest possible installation, without refinements of heat balance to promote this yield. The plant produced about 25 kw.hr. per 1,000 lb. of steam passing through the main unit, but the steam used for high-pressure feed heating added about 12 per cent to the process demand, and as a result the yield of byproduct power was about 28 kw.hr. per 1,000 lb. of steam delivered to the refinery, when the turbine was operating at full load. A later installation in the same refinery was designed for higher pressure, 650 psi., and for a slightly higher temperature, 670° F.

### Slow Growth of High Pressure

In the subsequent 10 years, only eight American refinery power plants were built for operation at high pressure, all but one in the range of 550 to 650-psi. pressure, and the steam temperatures in these plants ranged from 700° to 750 ° F. The exception was designed for 835 psi. but the temperature, in this case also, was only 750° F. During the war, developments of this type were naturally retarded. One 600-psi. plant and one 700-psi. installation, both using steam at 800° F., authorized before Pearl Harbor, were completed, but for the most part refinery power-plant extensions during the war were low pressure, many of them using second-

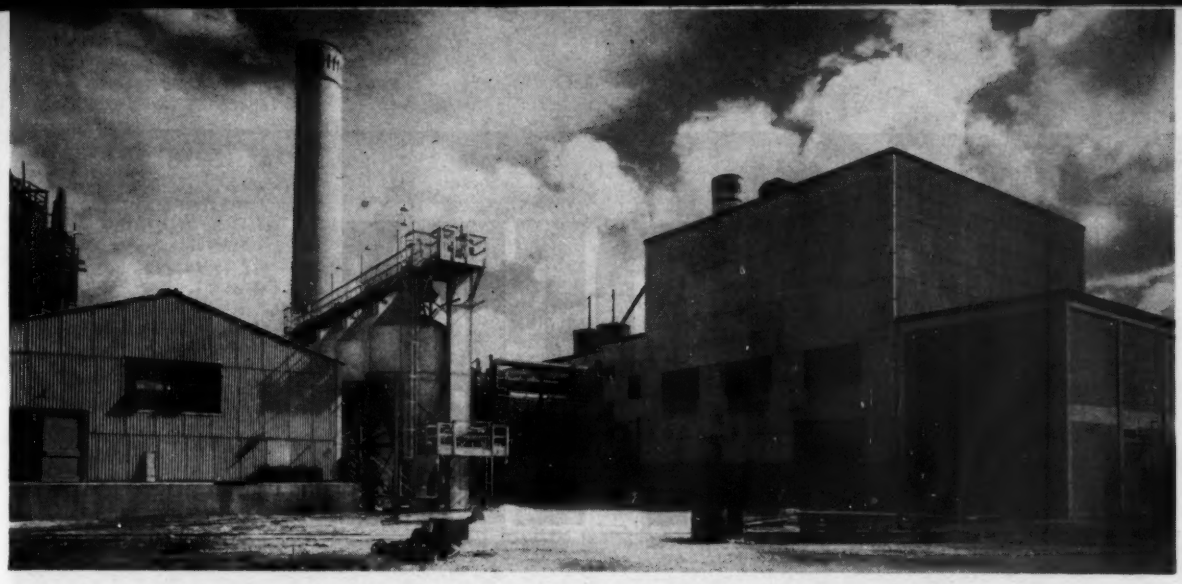


*Fig. 4—A recently completed refinery power plant. Water-treating plant at left, outdoor boiler in middle background. Enclosed turbine room, and brick electric switching structure at right*

hand equipment. In any event, designs were determined more by availability of materials and regulations of War Production Board than by normal engineering considerations.

The exception to the average run of pressures in prewar refinery power plants was that constructed in the Richmond refinery of Standard Oil Co. of California. This plant, built in 1936, originally contained three 4,000-kw. turbines, exhausting to the refinery at 130 psi. Steam was supplied by three boilers each having a steam generating capacity of 125,000 lb. per hour at 835 psi. and 750° F. Subsequent additions were designed for the same pressure and temperature. In 1936, 850° F. was a fairly common steam temperature in public-utility plants and 900° F. was coming into use, but in line with usual refinery practice, the temperature at Richmond was limited to 750° F. At the time of installation, there was no great urgency for high yield of byproduct power, and the relatively high steam pressure was adopted more for expected future demands than for conditions prevailing at the time of installation. Nevertheless, this plant represents the highest pressure prewar design features. It, therefore, warrants some description.

On account of the relatively low power demand, in proportion to the steam requirements, no effort at high yield was made in the initial installation. No high-pressure heater was installed, to say nothing of other possible refinements of heat balance. As a result of this, and as a result of partial load operation of the main turbines, the net power production was only about 30 kw.hr. per 1,000 lb. of steam delivered to the refinery, during prewar operation, although at least 60 kw.hr. per 1,000 lb. of steam could be developed between 835 and 130 psi. by greater refinement of the heat-balance design. Provision was made in the original design, however, for later addition of equipment which could increase the yield, when required, and the turbines were so designed that they could be converted, at a later date, to exhaust at 25 psi. with controlled extraction at the present exhaust pressure. The boiler design pressure of 900 psi. would also permit a small increase in throttle pressure if it became necessary to get the last ounce of byproduct power.

Physically, this power plant was a compromise between complete housing of equipment, as was the case in the Gulf plant at Port Arthur, and the arrangement which is more usual nowadays, in which the boilers are out-of-doors like comparable process equipment in the refinery. At Richmond only the draft fans and air preheaters are out-of-doors. All of the auxiliaries are steam driven and all are at ground level. The main turbine generators are also at ground level; the use of integral air coolers, built into the generator casing, facilitated this design. This arrangement required a small basement, or tunnel, underneath the machines to provide a getaway for the process steam lines and for drips and space lubricating and other auxiliary equipment, but otherwise all operations are at ground level, an obvious convenience and a material saving in building costs as compared with the more usual multilevel designs.

Boilers, turbine generators, and controls, both steam and electric, are housed in a simple structure of inexpensive materials, and there is no partition between the turbine room and boiler room. Fig. 1 shows a cross-section of the original installation. Figs. 2 and 3, showing interior views reveal the excellence of engineering detail in the design of this plant, resulting in a reliable installation convenient to operate and, within the limits of its basic cycle, extremely efficient.

Like all refinery power plants, the Richmond plant receives little condensate returned from the refinery and the large quantity of feed water makeup requires careful chemical treatment. In the early days of refinery power plants, feed-water treatment was relatively unimportant. Scale was turbined from the boiler tubes at regular or irregular intervals and cylinder heads were replaced when carryover, or "slugs" as they were called, filled an engine cylinder with water. With high-pressure boilers, operating at elevated temperatures and at high rates of heat transfer, no appreciable amount of scale can be tolerated. Also, a high degree of steam purity is required. Otherwise, salts carried over in moist steam deposit in superheaters, or, if carried over in the vapor phase, solidify in some stage of the turbine where the temperature conditions are favorable.

The water-treating plant provides for the treatment of 600 g.p.m. of boiler-feed makeup water in two stages. The first stage is a cold treatment to reduce silica, using ferric sulfate, caustic soda, and recirculated sludge with flocculation, settling, and gravity-type filtration. The second stage is a hot process, utilizing sodium phosphate and sodium sulfate, together with recirculated boiler blowdown water. The second stage also includes mechanical agitation, settling, deaeration, and filtration. Sodium sulfite is added to the deaerated water at the feed pump suction, and sodium phosphate is fed directly into the boiler drums. Later, carbonaceous zeolite softeners were installed to take the place of the hot phosphate softening treatment.

**References**

1. See "The Value of Higher Steam Pressures in the Industrial Plant," Transactions, A.S.M.E., 1925.

2. See "Progress of Higher Pressures in the Industrial Plant," Mechanical Engineering, June 1940.

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# Combination Drive

# Adapted to Unitized Drilling Power Plant

*by Neil Williams*

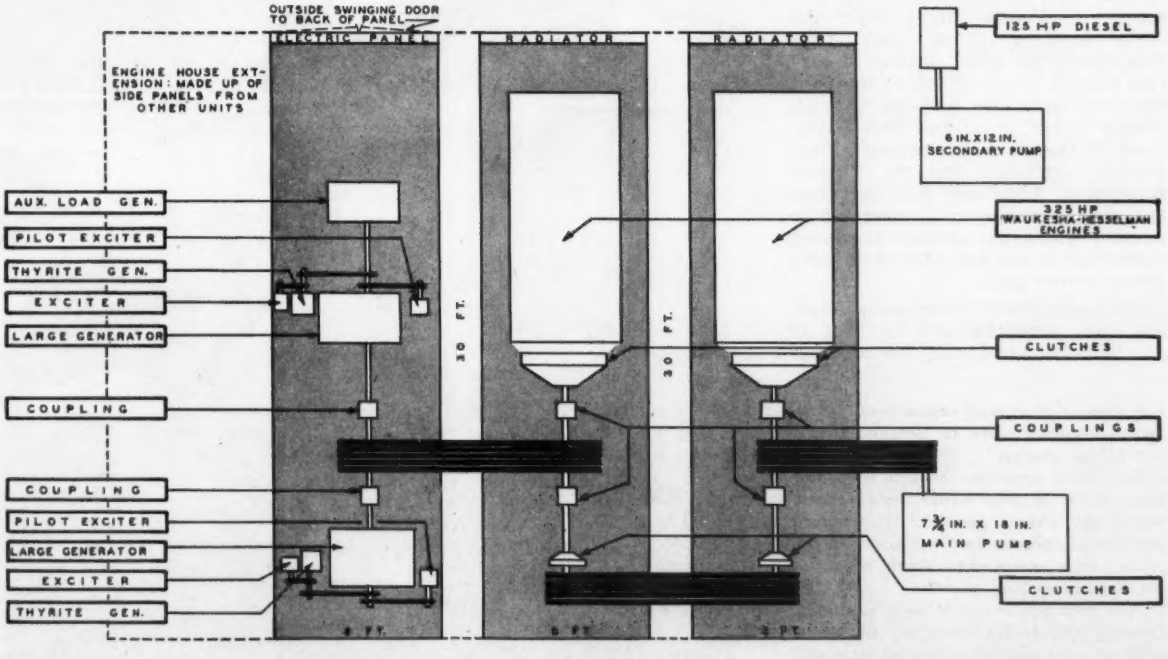
THE power assembly provided by Noble Drilling Corp. to drill Standard Oil Co. of Delaware's deep exploratory test at Cape Hatteras, North Carolina,[1] embodies a number of innovations both in the operating hookup and control, and in the arrangement and unitization of facilities. Similar installations, designed and initially set up in this company's Seminole (Oklahoma) shops, recently have been made on several other rigs.

Primary power for the Hatteras installation is supplied by two 325-hp. Waukesha-Hesselman engines. These are compounded in a direct V-belt drive to the main mud pump, and to generators furnishing electric power for hoisting, rotary table operation, and auxiliary service. The Hesselman engines, which employ spark-plug ignition with a diesel-engine method of fuel injection, and run either on gas, butane or diesel oil, used diesel fuel on this well.

Of particular interest in connection with the engine operation is the "steam cooling" system provided for the jacket water. This system was designed to permit operation of the engines with high jacket water temperature (212° to 215° F.) and consequent maintenance of a more even temperature of the engines. Temperature differentials are reduced over the length of the liners and block over the full load range from idling to full load speeds. The high temperature, which is above the dew point of the exhaust gases, vaporizes any moisture that might be contained in the fuel or oil so that it goes out the exhaust instead of condensing and being deposited on the cylinder walls to be wiped down by the rings and mix with the oil to form sludge.

**The power plant described is contained in three skid-mounted units complete with individual housing forming a single large engine house when the units are set up on a drilling location. Special features include "steam cooling" for engine jack water.**

In the system, which is entirely closed, the engine cooling water is circulated by the regular engine pump into a large cylindrical tank mounted above the radiator. The circulating water without radiation flashes into steam inside the tank. The steam is taken off and condensed by the fan and radiation assembly below the tank. The radiation assembly consists of the radiator used for circulation of the jacket water in a conventional cooling system. Here the radiator is used solely as a condenser. A small (½-in.) rotary pump located at the bottom of the radiator picks up the accumulating condensation and puts it back into the overhead circulating tank, from where, at a boiling temperature, it is circulated to the engine jacket. The circulating tank is provided with a sight glass for visual indication of the water level so that makeup water can be added when needed, although this is seldom necessary. A small pop valve, set at 1.5 psi., in the top of the tank pro-




*Floor plan of unitized rig power house showing compounding of engines in direct drive to main mud pump and to generators supplying electric power for hoisting and rotation*

vides for relief of any excessive pressure that might build up in the system with the rise in temperature that normally occurs for a short time after shutdown of the engine and cessation of water circulation. The pop pressure is low enough to be within the limits of safety for the system, yet high enough that the valve will not open too quickly and allow unnecessary loss of water in the form of steam before it has time to cool and condense.

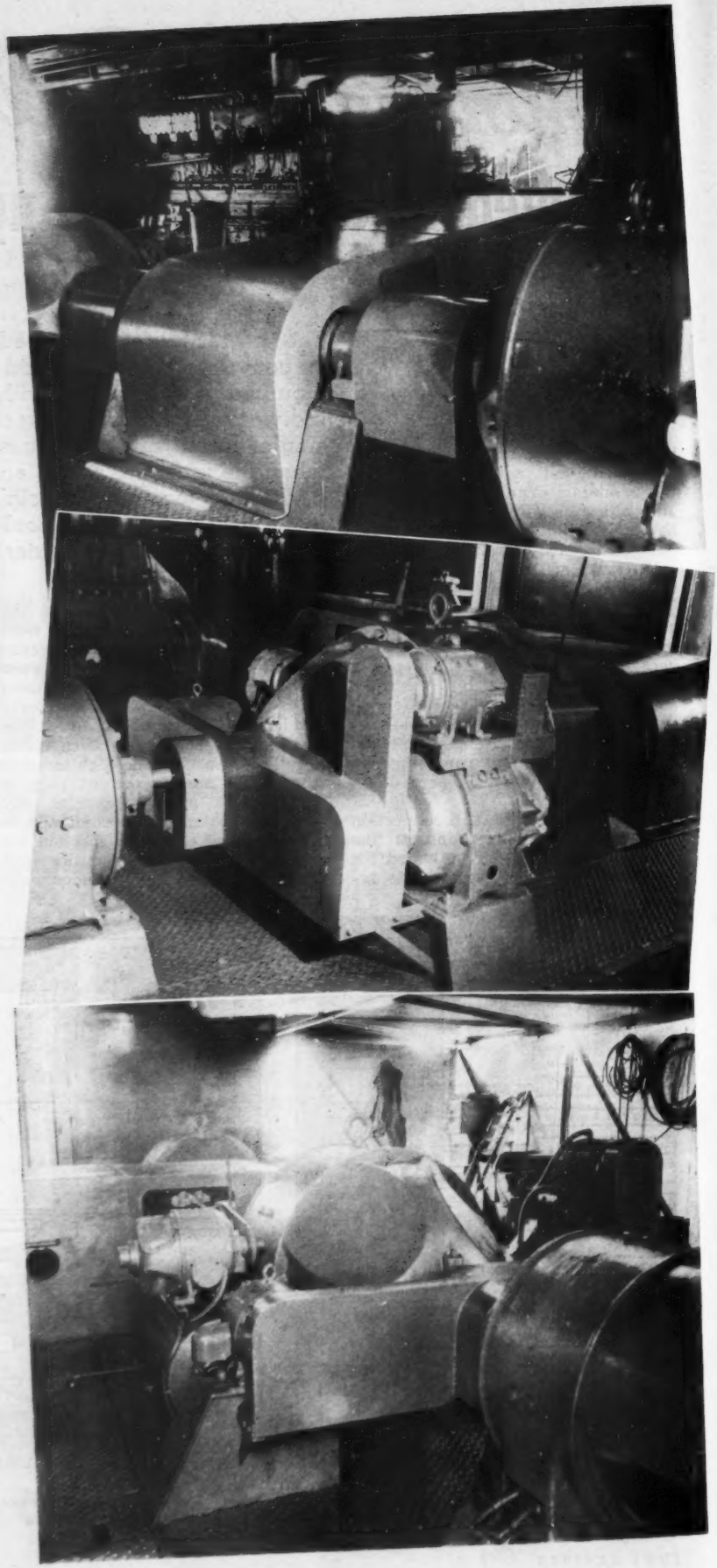
The electrical installation was designed for simplification of wiring and control, and in it there are less wiring and fewer controls than on any other electric rig in use by the company. The two main generators supplying the hoisting and rotary power are on a common power shaft, V-belt driven from the engine compound. These installations are identical and their respective outposts are interchangeable for either hoisting or rotation power or for common use.

Both generators are shunt wound and separately excited with an individual pilot exciter, each V-belt driven from the main generator power shaft. The pilot exciters are small compound wound generators and their outputs directly connected to the shunt fields of their respective large generators. Their shunt fields in turn are controlled by the driller's rheostat. This type of excitation offers a delayed action on the large generators, which is desirable.

### Auxiliary Power Loads

Auxiliary loads, such as lighting, motors for shale shakers, blower fans, washdown pumps, etc., are handled by two Thyrite generators, each also separately V-belt driven from the main generator power shaft. They also supply the small amount of current needed for excitation of the pilot exciters. Each also includes a small "piggie back" generator, belt-driven from its Thyrite generator shaft. They provide excitation for the Thyrite generators. Additional auxiliary load and excitation current is supplied by another generator, driven by direct connection to the extended main generator power shaft.

Main generators are mica insulated, and thus, although each is rated at 125 kw., 250 volts, and 500 amp. at



*Top: Interior of unitized engine house showing compounded drive to generators from two 325-hp. engines*
*Center: Main generator hookup with auxiliary drives to pilot exciter (back of generator) and Thyrite generator (foreground). Identical installation (not visible) is on opposite end of power shaft. Partly visible at left is auxiliary load generator*
*Bottom: Back side of one of main generators showing pilot exciter drive and motor-driven compressor installation. Second main generator is visible beyond engine drive guard, and auxiliary load generator at right*

1,200 r.p.m., both are capable of overloads considerably in excess of their rated capacities. All wiring leads, control points, and instruments are concentrated on a single panel on the generator unit.

Mill-type motors are used for hoisting and the rotary table. Each is rated at 187 hp. with 250 volts at 436 r.p.m., but, like the generators, they are mica insulated and capable of considerable voltage overloads with higher r.p.m. If the power were available it would be possible for them to take 500 volts up to maximum speed of 1,400 r.p.m. for short periods without damage. Overloads up to 400 volts with speeds of 900 r.p.m. have been handled at times.

One of these motors is provided for the rotary table and two for the draw works. In each case they are direct connected. The draw-works motors are mounted, one at each end of the main power shaft, having a chain drive to draw-works transmission. The wire-line coring sand line reel also is powered by these motors by a chain drive from the sprocket normally used for the rotary drive in conventional assemblies.

The engine and power plant assembly, including its housing, is contained in three skid-mounted units, each 8 ft. wide and approximately 30 ft. long. One engine and its rotating elements (shaft, clutches and V-belt pulleys) are on one skid. The other engine and its rotating elements are on the second skid. The generator installation is on the third skid.

Each unit is separately enclosed with housing of sheet-steel construction supported on the skid base. Each of the engine radiators serves as one end of the housing for its respective skid unit. The wiring control panel serves as one end of the generator unit house. The back of the panel, on the outer side of the house, is faced with solid sheet-steel doors which provide ready access to all wiring points.

On location, the three units are placed side by side with the generator unit skid in front nearest the rig, and the engine unit having the main pump drive at the back. They are spaced to conform with the length of the V-belts connecting the drive pulleys on the respective units, and when set up form a single large, fully enclosed engine house.

### Housing Construction

Sides of the individual houses are made up in removable panels, four to a side. On hinges at the top, the front-side panels of the generator house are raised from the bottom to form the roof for a front extension to the engine house. Panels forming the interior sides of the individual houses are detached and set up to form the front side and ends of the engine-house extension. The outer side panels of the rear engine house can remain in place to complete the enclosure. One of the latter panels has an opening for the V-belt drive to the main pump power pulley.

Flap panels, 18 in. wide, hung by hinges along the top side edges of the individual houses, swing over onto the tops of adjacent houses to form a continuous roof over the spacing between the houses. When the side panels are in place for moving the units, these flaps lay back out of the way onto the tops of the respective houses. Similar flaps hinged along the bottom edges of the skid bases lay over onto adjacent skids to provide a continuous steel flooring over the spacing. These lay back onto the floors on the inside of the respective individual houses when side panels are in place.

V-belt guards between the units are built in two overlapping sections, and the respective sections slide back on the floor of the individual units a sufficient distance to provide clearance for placing the side panels during moves. For moves, the V-belts are merely slipped off the pulley at one end and thrown back on the floor of the adjacent skid. However, to remove the belt from the pulley on center unit drive to the generator shaft it is necessary to disconnect and pull the shaft from that pulley. The guard on the V-belt drive from the back engine shaft to the main pump also is in two sections. The section on the inside of the house is hinged at its lower end to the floor so that it can be raised to pull in the belt for moves. When the belt is in operation, the other end of the guard section is bolted flush to the belt opening through the side panel.

The two mud pumps on the rig are moved as separate units. The secondary pump is independently driven by an individual diesel engine, and thus has no connection with the main power plant.

Housing for the pumps at present is temporary. It originally was proposed, however, that sufficient extra side and end panels be provided to form a rear extension to the engine house for the pumps similar to the front extension. In this case, the back side panels of the rear engine unit would be raised to form the roof of the pump house extension, and the extra panels, which would be carried on one of the units, would be set up as the walls.

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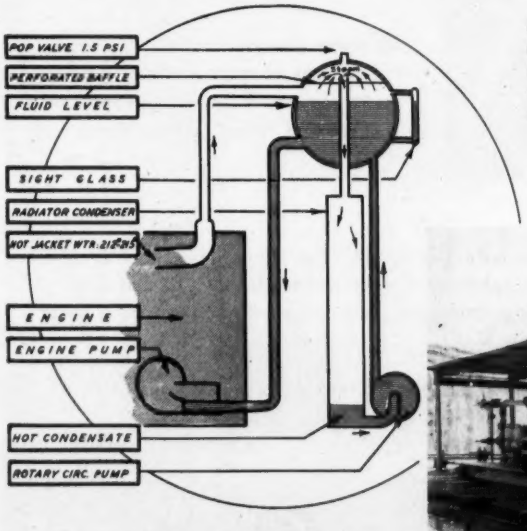
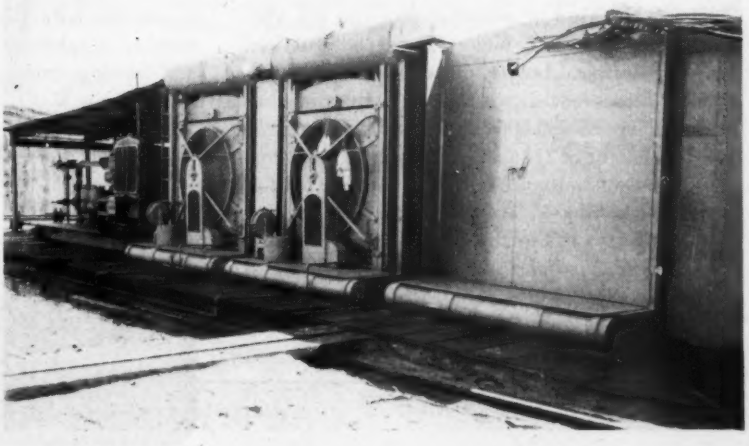
1. Neil Williams: "Esso 1 State—Nation's Most Easterly Test Exemplifies Modern Exploratory Operations." The Oil and Gas Journal, May 18, 1946, page 114.




*Schematic diagram of steam cooling system for engine jacket water using radiator for condenser*



*Right: Front end of unitized engine house showing radiator and steam cooling installation on each of two engine housing skids. Door panels on front of generator skid unit (right) open to provide access to back of electrical control panel*

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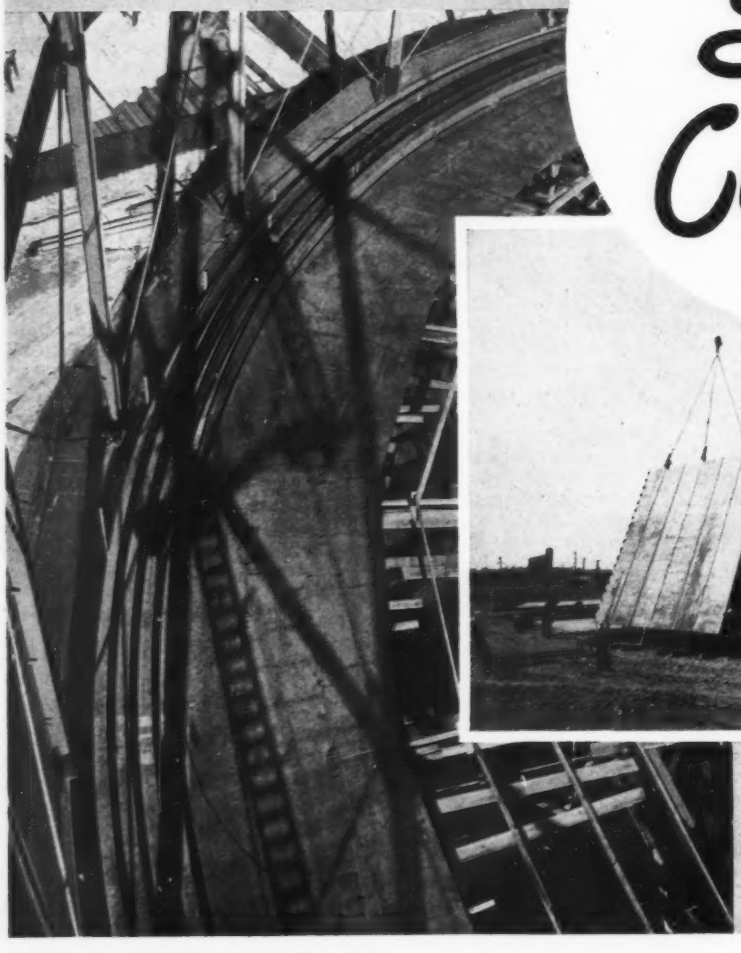

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# Plastic Tank Coatings Resist Sour West Texas Crude Corrosion

**by George Weber**

SUCCESSFUL protection against corrosion by sour crude and salt water has been obtained through use of a plastic coating employed on the interior of oil tanks in West Texas. Results of a 2-year trial of the material under extreme corrosive conditions indicate that it may prove a long-term solution to many field-corrosion problems now confronting producers.

The liquid type, chemically inert thermoplastic resin, termed Resoweld, is a wartime product developed by Goodyear Tire & Rubber Co. It has been adapted to oil-field use by French Tool & Supply Co. of Odessa, Tex. To date, its principal use in the oil industry has been in lining all types of oil tanks, but further employment in pipe lines and flowing wells is being investigated and tested with the cooperation of several major oil companies and independent operators.

When first considered for trial in West Texas, it was decided that the new product should be given the most stringent tests possible. A consensus among engineers and operators of the area indicated that E. H. Griswold's Connell lease in the Penwell field of Ector County presented one of the most corrosive conditions of any oil property in the Permian basin. With the consent of the operator, that lease was picked for a test case.

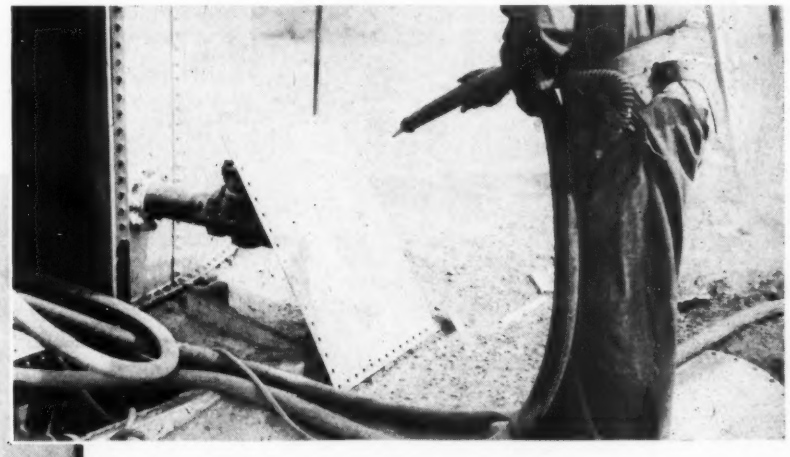
The lease produces approximately 10 per cent salt water with the high-sulfur crude. Oil-treating temperatures range from 104°-110° F. and actual temperature above the oil surface runs much higher during summer months.

The original uncoated storage tanks on the Connell lease began leaking after 4 months of operation, and were corroded beyond further use before they had given a year of service. The replacements, also uncoated, corroded through in 6 months and lasted about 1½ years with numerous repairs made in the interim.

In August 1944, two new Hi-500-bbl. bolted steel tanks were installed and coated with Resoweld. The tanks were last cleaned in April 1946 after 20 months of service and the detailed inspection revealed that the lining had not hardened or softened and had completely resisted deterioration and prevented corrosion of the metal.

Following its original application of Resoweld in Penwell, the French company has successfully lined nearly 100 tanks ranging from 250-bbl. settling tanks to 40,000-bbl. tank-farm units in West Texas, Panhandle, and New Mexico. The product is now undergoing tests for other uses. At Penwell, where corrosion often causes tubing failures in 6 to 8 months, pup joints in a string of tubing were coated with the plastic and installed 10 months ago. In a 4-in. Andrews County field line, random sections coated inside and out are in trial operation. Neither of these applications has been inspected since installation, but operation to date has been satisfactory.

A major factor in the plastic's successful service is its careful application under expert supervision by crews thoroughly trained for that type of work. The most important step is the preparation of the metal surface to be coated. New tanks are cleaned and sand-blasted before the



*Blasting with heated creek washed sand at 100 psi. air pressure assures a clean surface for the primer coat*

*Below: Typical lease tank in West Texas showing oil leaks from sour crude corrosion. Such tanks are repaired, cleaned, and sand blasted twice before plastic coating is applied*

primer is applied. Used tanks are cleaned, brushed, scraped, aired 2 days, and sand-blasted twice. Local sand was found to leave a deposit of finely divided caliche on the metal surface after blasting, so creek-washed sand is imported. The sand is passed twice through ⅛-in. screen, heated, and employed at 100 psi. air pressure.

Although the liquid coating may be applied by dipping or brushing the spray method is used in lining field tanks in place. Original field trials were made with two primer and six top coats, but reduction of tank down-time was desirable. In order to accomplish this, the body of the liquid was doubled, thus reducing the number of coats 50 per cent. However, this method still supplies the same thickness of protective film. Current practice, beginning with the Griswold test, is to apply one primer coat and three top coats. The primer air dries in from 15 to 45 minutes after application, and each top coat is allowed from 1 to 2½ hours' drying time to assure removal of all solvent. The primer is dark red in color and top coats are applied in alternating white, black, and white to afford visual proof that each coat is uniform and complete. New tanks require a maximum of 2½ days for complete preparation. Used tanks may be coated in 4 days or less, depending on the cleaning and repairing required.

Resoweld, when properly applied, remains in a semiplastic state, forming a firm bond to metal without sagging or pulling. It is sufficiently flexible to withstand bending to 100° F. without separation, and will not chip under impact. Tanks so lined have been steam cleaned without injury to the coating, but exposure to sustained temperatures exceeding 150° F. is not recommended.

Experience has shown that paraffin will not adhere to the glossy film surface at temperatures encountered in Texas and New Mexico fields. An exterior tank coating comprising one primer and two top coats has withstood exposure to direct sunlight in West Texas for 20 months without visible effect. Tests further show that corrosion will not spread under the coating from an exposed metal surface. A nonconductor of electricity, it arrests electrolytic corrosion in tanks and pipe lines. Current tests indicate that Resoweld arrests bacterial action believed a factor in sulfur corrosion.

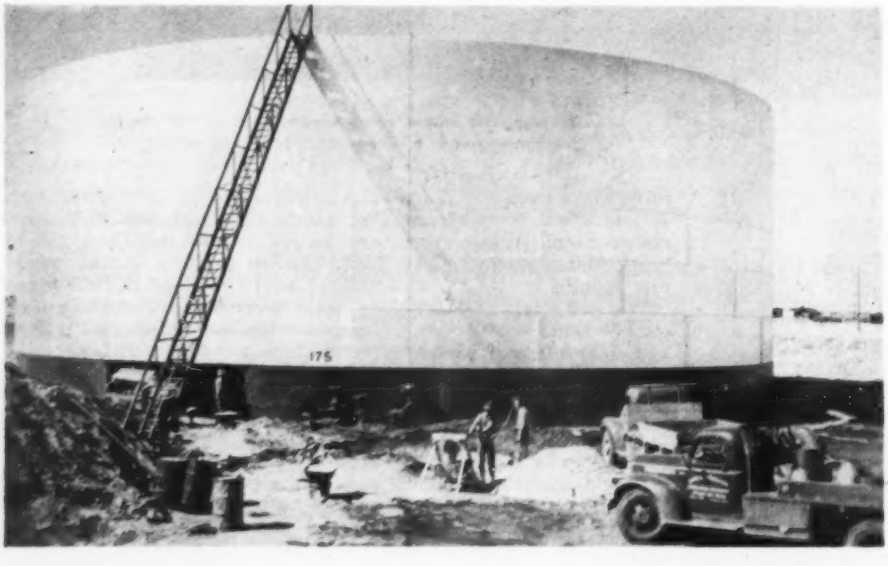
*Compressor equipment employed in coating field tanks in place*

### Bonding Properties

The plastic also forms a satisfactory bond with clean unpainted wood and concrete. It is recommended that concrete be etched with dilute muriatic acid, followed by neutralization, rinsing, and drying before application of the primer coat. The film shows good tear resistance and is noninflammable. Resoweld coatings may be successfully baked after application, providing maximum bond and protection.

The plastic will stand prolonged exposure to the following chemicals: 10 per cent sulfuric acid at 135° F.; 50 per cent sulfuric acid; 10 per nitric acid; 20 per cent nitric acid; hydrochloric acid in any concentration; hypochloric solutions; 50 per cent sodium hydroxide; 85 per cent phosphoric acid; methyl or ethyl alcohol; saturated ferric chloride solution; salt solutions; lubricating oils; sour crude oil; 70 per cent ammonium nitrate; aliphatic hydrocarbons; sulfurous acid; hydrogen sulfide; 15 per cent chromic acid.

Its resistance to 25 per cent acetic acid is fair. It softens in aromatic hydrocarbons and chlorinated solvents, and dissolves in ketones. Its maximum service life in contact with sour crude and salt water may not be known for several years.



*During the past 2 years nearly 100 tanks ranging from small lease units to the large storage tank shown here, have been lined with Resoweld*

# Expansion Program

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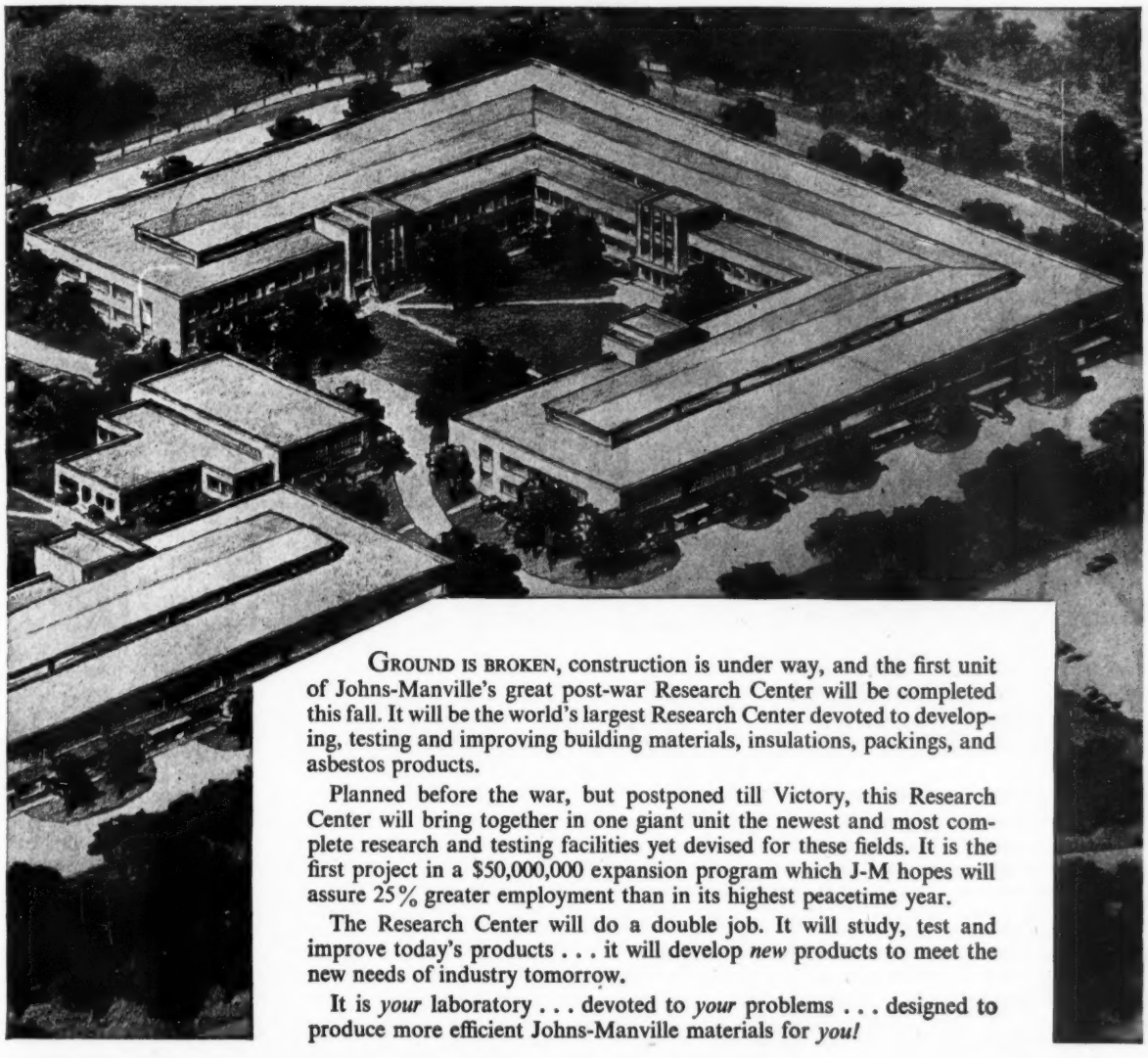

GROUND IS BROKEN, construction is under way, and the first unit of Johns-Manville's great post-war Research Center will be completed this fall. It will be the world's largest Research Center devoted to developing, testing and improving building materials, insulations, packings, and asbestos products.

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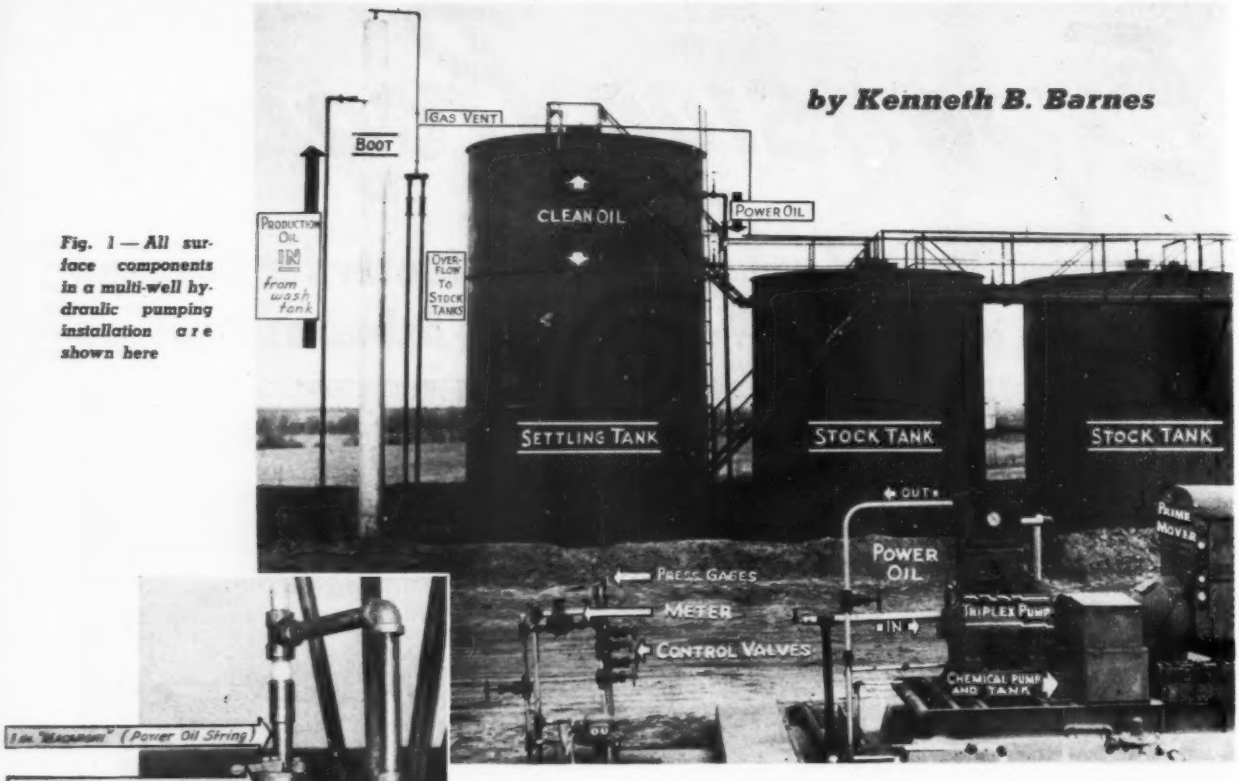



*Fig. 1 — All surface components in a multi-well hydraulic pumping installation are shown here*

**by Kenneth B. Barnes**

# Fluid Power Makes Subsurface Production Data Automatically Available

**SOME ask—why the emphasis on bottom-hole pressures?—why not just one or two, here and there, once in a while? Just one of the many reasons why engineers want bottom-hole pressures is in connection with obtaining productivity indices of wells. Productivity index is the measure of the well's ability to produce, and a gage for the future—the credit "bank balance" of the well. When wells are prorated or their production is restricted, unless productivity-index tests are made, the margin between the restricted rate and true well capacity is not known. Productivity index is easily obtained by the method and equipment described in this article.**

KNOWING what's going on in a pumping well isn't a simple proposition. Static and operating levels, productivity, and other factors all can change, and their changes will dictate what the well will do. Yet for efficient operations and in getting all the oil possible, these changes in subsurface conditions should be known, literally day by day if possible. As a matter of fact, "checking up on production" is the biggest and most important job of probably most petroleum engineers and many field men.

"Checking up" on pumping wells, and particularly those in the 4,000-8,000-ft. or deeper category in the Mid-Continent, Gulf Coast, Rocky Mountain, and California areas, however, usually presents difficult situations and considerable expense because so many different things have to be done. Pulling units, rod jobs out and in, and then back out and again in the second time (and sometimes also tubing jobs), bottom-hole pressure gages, stroke timing, etc., are involved.

A short cut in obtaining the desired subsurface information is to determine the fluid levels in pumping wells by sonic measurements, such as are made with Echometer or Depthograph equipment. Most direct approach is in the instance where hydraulic pumping equipment is installed, as the bottom-hole information is obtainable virtually automatically in this system because of the hydraulic linkage from the surface to the pump unit. In short, the pressure at which the oil at the surface is supplied to the well is proportional to the producing bottom-hole pressure.

In the hydraulic system of pumping here described, any change in well conditions—lowering or raising of fluid levels—pump-off conditions—gas—water—is immediately reflected by surface gages.

### Operation of Hydraulic Pumping System

For those who are not familiar with the hydraulic linkage method of pumping, a brief description starts with the surface power unit (or triplex pump). This supplies power oil under varying pressures to a subsurface production unit consisting of engine and pump. The power oil is distributed from the triplex pump or pumps through a manifold to one or several wells under the required pressure for each well. Shown in Fig. 1 is a single power unit used to produce a number of wells, together with the production tanks from which clean oil is taken from the top to supply the power oil needed to operate the engine end of the subsurface production unit.

The power oil generally is conducted by 1 or 1¼-in. pipe from the surface power plant to the well head. The inset of Fig. 1 pictures a standard well-head installation. From the well-head, the power oil is conducted either through 1 or 1¼-in. upset seamless tubing—sometimes referred to as macaroni—to the production unit set at a predetermined level, usually just off the bottom of the hole.

Pump end of the unit is seated in a shoe in the production tubing. Its intake is open to the formation fluid which it draws in as it pumps and discharges to the inside of the production tubing. The engine end of the production unit which actuates the pump is driven by the power oil. After performing its work, the power oil is discharged into the production tubing and rises to the surface with the produced fluid.

### How Bottom-Hole Pressures Are Obtained

From the foregoing description it may be visualized that the column of power fluid in the small tubing and the column of uprising fluid in the production tubing form a U-tube system. This provides a balanced circuit of the power oil itself so that small friction losses are the only work consumed in circulating the power oil. Fig. 2 schematically illustrates this effect.

Disregarding the minor friction loss of the system,* the only work done by the hydraulic engine pump is to lift the production fluid from the fluid level of the well to the surface discharge point of the system. As illustrated in Fig. 3, if the fluid level in the well is high, the pump will start to function when the power oil is at a lower pressure, for there is little work to be done. As the fluid level is lowered by pumping (Fig. 4), more pressure is required to lift the oil to the surface. This is directly reflected in the amount of pressure required to make the engine pump operate and is recorded by the surface pressure gage which is open to visual inspection by the pumper.

To illustrate further the relationship between fluid level and pumping pressure, consider first the conditions of Fig. 3 where the pumping fluid level of the well is only 1,000 ft. from the surface. The power oil is supplied at 400 psi. pressure.

Later, as the fluid level in the well falls off, the operating pressure will have to be increased. In Fig. 4 the operating fluid level is 7,000 ft. from the surface, the power oil at 2,800 psi.

Assume, for illustration, that the fluid in the production tubing and in the well bore or casing annulus weighs or exerts a pressure of 0.4 psi. per ft. of height. It will be noted in Fig. 3 that the pump is lifting the entire fluid column in the production tubing. The unit of weight or pressure of this column on the pump piston will then be the height in feet multiplied by the unit pressure per foot of height, 7,500 ft. × 0.4 psi. per ft. = 3,000 psi. However, the operating fluid level stands in the casing 6,500 ft. above the pump, or to within 1,000 ft. of the surface. This column of fluid is exerting a pressure against the pump piston helping it to move against its pumping load. The amount of this help will be 6,500 ft. × 0.4 psi. per ft. = 2,600 psi.

The load then is 3,000 psi. and the help of the fluid level is 2,600 psi. Therefore, the extra pressure necessary to move the pump will be 3,000 psi. — 2,600 psi. = 400 psi. This will be the pressure shown by the surface gage when the pump begins to stroke.

In Fig. 4, the reasoning is the same.

*This is accounted for in a more detailed explanation given in the appendix.

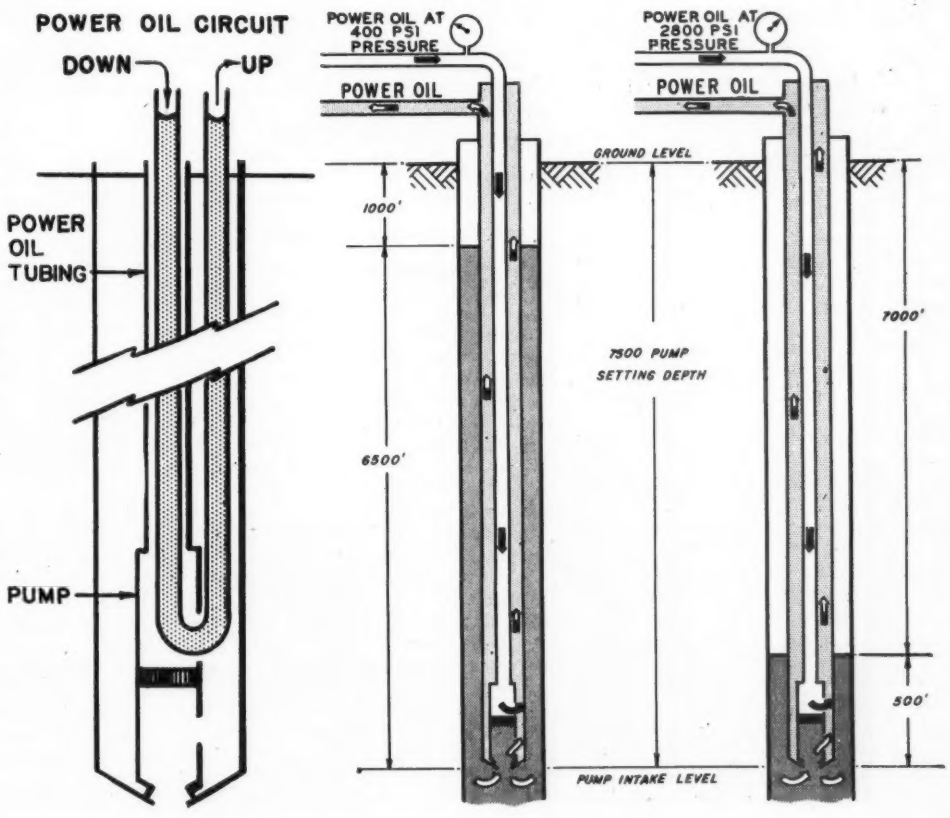



*Fig. 2 — The power oil circuit, basically amounts to a U-tube arrangement, as shown in the drawing immediately to the right*

*Fig. 3—(Center) This is the relationship of operating pressure to "producing level" in a high-fluid-head well*

*Fig. 4 — (Extreme right) The operating pressure is higher in a low-fluid-level well*

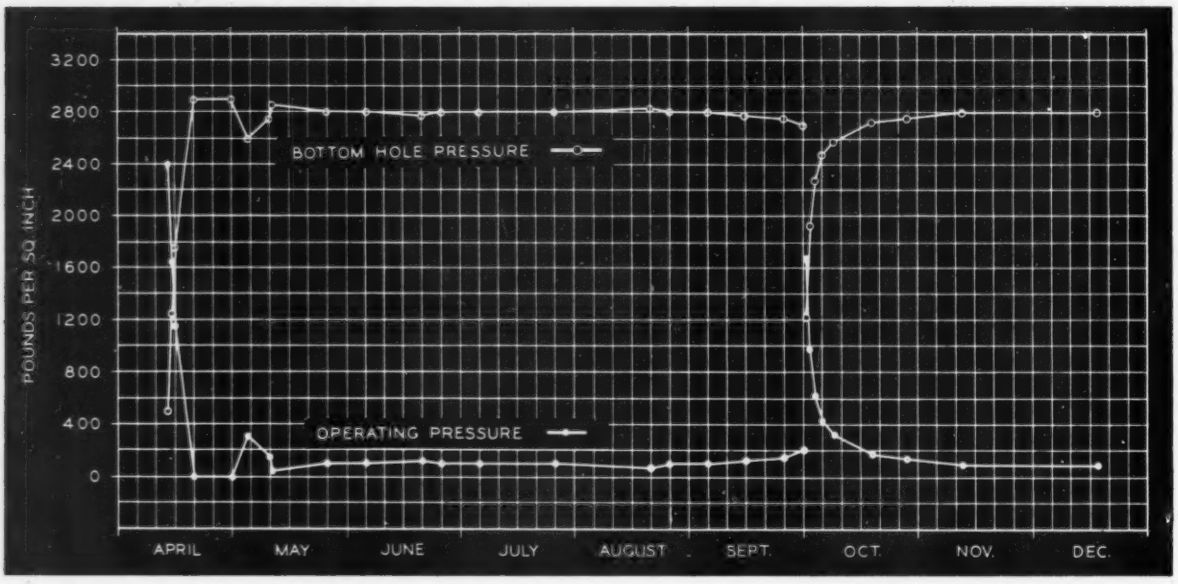



*Fig. 5—A West Edmond property—nine months' chart of operating pressure and bottom-hole pressure*

The pressure of the production column at the pump is still 3,000 psi., but the fluid level has dropped to 7,000 ft. and the pressure on the pump piston, to counteract the production column pressure, is only 500 ft. × 0.4 psi. per ft. = 200 psi. The extra pressure now necessary to move the pump piston is 3,000 psi. — 200 psi. or 2,800 psi., which will be recorded on the surface gage.

In these cases the fluid levels have been assumed in order to develop the actual pressures which will be shown on the surface gage. Of course, this is backwards to the actual field problem, but the process is just as easily followed in reverse.

The situation, then, for an actual well is: The operator knows three things easily and positively. He knows that the pump is set at 7,500 ft.; that the fluid weighs approximately 0.4 psi. per ft., and that the surface gage shows an operating pressure of 400 psi.

From this pressure he can quickly calculate the fluid level in the casing. The setting depth times the fluid weight, 7,500 ft. × 0.4 psi. per ft. = 3,000 psi. The surface gage shows a pressure of 400 psi. The help or pressure of the fluid level (bottom-hole pressure at the pump setting) is 3,000 psi. — 400 psi. = 2,600 psi. The height of the fluid level will then be this pressure (2,600 psi.) divided by the unit weight or pressure per foot of the fluid (0.4 psi. per ft.) or $\frac{2{,}600 \text{ psi.}}{0.4 \text{ psi. per ft.}}$ = 6,500 ft.

In making the first observation of the operating pressure, the pump is shut down by pinching in on the flow-control valve. As the pump slows down the operating pressure decreases and the operator notes the pressure at which the pump makes its last stroke. This pressure, because the fluid is moving slowly and the pump is moving slowly, is actually the measure of the pressure necessary to lift the fluid, and does not represent any fluid or pump friction due to speed.

From the foregoing illustrations, it can easily be seen that the operating pressure of each well forms an index which quite closely defines bottom-hole conditions. It is interesting to note that while the question of gas in the production column will affect the accuracy of the figures, it has been found practical to apply this method of bottom-hole determination as a guide to production practices.

### Data Charted in Continuous Form

As operating pressures are constantly available at individual well surface gages, some producers are establishing the practice of making daily observations which are recorded on a chart. From these data a corresponding chart of indicated bottom-hole histories is developed, thereby providing a basis for determining the withdrawal rates and other factors that will make possible the most economical production practices for the individual property. One of these charts of operating pressures and resultant fluid indications, set up for several wells in the West Edmond field, is shown in Fig. 5. On this lease the operating pressure on the subsurface pump started at 500 psi. on April 13 and increased to 2,900 psi. on April 21. This was during the early stabilization of the well and correlation of operating data. As has been previously explained, this operating pressure indicates a completely pumped-down well. Observation of the operating gage on the metering control assembly at the central plant also indicated pumpoff.

Subsurface pump speeds were decreased from 35 to 26 s.p.m. between April 30 and May 4, with the resultant drop in operating pressure from 2,900 psi. to 2,600 psi. This indicated a rise of fluid in the well which, based on fluid density, indicated an operating bottom-hole pressure of 300 psi. Pump speed was then increased to approximately 34 s.p.m. at which point the operating pressure again rose to 2,600 psi. and productivity of the well established at 40 to 45 bbl. per day of oil with no water.

On the above West Edmond property, pumping cycle has been set at 12 hours per day. Operating pressures vary from 2,600 psi. to 2,900 psi. from start of daily pumping cycle to end of 12 hours, at which time complete pumpoff is indicated. This change of operating pressure is caused by lowering the fluid column above pump intake which in this case was but a few feet off bottom of the 6,833-ft. total depth of the well.

### Appendix

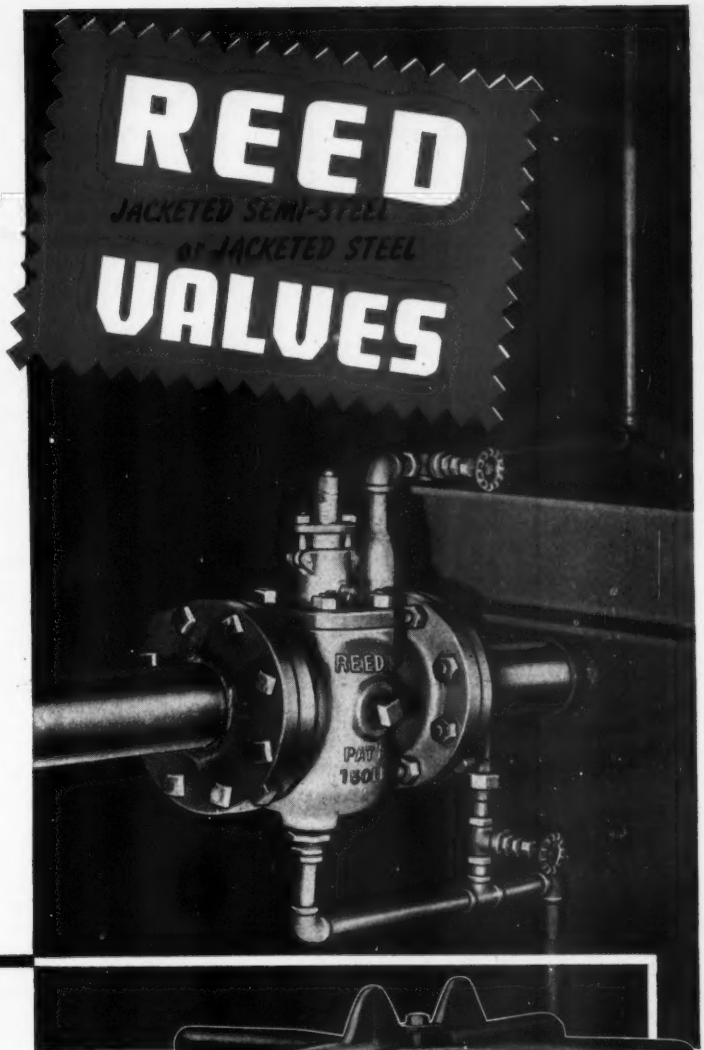
A more rigorous approach to the calculation of bottom-hole pressures from hydraulic pump operating data, as developed by C. J. Coberly, is in part as shown in Fig. 6.

For the simplest case the densities in the two columns are the same, the plunger areas are equal, and the surface discharge pressure, $P_s$, is zero.

If $h_1$ equals $h_2$, as is generally the case, it is obvious that the column pressures balance out and that the working pressure applied at the surface is the pressure of the net lift:

$$P_1 = P_2 - P_4 \quad \text{or} \quad P_4 = P_2 - P_1 \quad (1)$$

# *Keep those Viscous Materials moving with*

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The bottom-hole pressure is the full column pressure to the datum level less the surface operating pressure. The full column pressure can be computed from the pump setting and average fluid density. The operating pressure is observed at the triplex if a single-well installation or at control valve if a multiple-well system.

The application of back pressure, $P_5$, increases the pressure $P_3$ against which the pump piston is working and in addition is a direct back pressure against the bottom-hole operating engine piston, (since it is not balanced by the operating column). Its effect on the operating pressure is therefore doubled. Equation 1 then becomes:

$$P_4 = P_3 + 2P_5 - P_1 \qquad (2)$$

If the ratio of areas is not 1:1 then the operating pressure must be corrected by the ratio in use:

$$P_4 = P_3 + \left(1 + \frac{a_1}{a_2}\right) P_5 - \frac{a_1}{a_2} P_1 \qquad (3)$$

When water production is appreciable the column densities differ and a correction must be applied to get the true pressure difference on the operating piston. The load on the pump piston is also greater because of the heavier column. Again assuming an area ratio of 1:1, Equation 2 becomes:

$$P_4 = P_3 + 2P_5 - [P_1 - h_1 (d_2 - d_1)] \qquad (4)$$

and $$P_5 = h_3 (2d_2 - d_1) + 2P_5 - P_1 \qquad (5)$$

Combining both the area ratio and column density factors, Equations 4 and 5 become:

$$P_4 = P_3 + \left(1 + \frac{a_1}{a_2}\right) P_5 - \frac{a_1}{a_2} [P_1 - h_1 (d_2 - d_1)] \qquad (6)$$

$$P_4 = h_1 d_2 + \left(1 + \frac{a_1}{a_2}\right) P_5 - \frac{a_1}{a_2} [P_1 - h_1 (d_2 - d_1)] \qquad (7)$$

From Equations 1 to 7 the bottom-hole pressure may be determined. If, however, the upcoming column contains free gas the pressure of this column ($P_3$) cannot be readily estimated. To avoid this difficulty sufficient back pressure is applied to the tubing head to hold the gas solution. The back pressure required to hold this gas in solution is less than one-half the bottom-hole pressure, since the oil temperature at the surface is less than at the pump and the upcoming column of oil is diluted with power oil, which has been stabilized at atmospheric conditions.

### Equations Involving Friction

From Equation 7 the bottom-hole pressure can be obtained with any column density, piston area ratio, or tubing back pressure.

All of the above relations assume static conditions. When the pump is in operation friction losses must also be taken into consideration. These losses consist of fluid friction in the power tubing, fluid and mechanical friction in the bottom-hole unit and fluid friction in the upcoming fluid. The fluid friction in the power tubing and the losses in the bottom-hole unit add directly to the operating pressure. Losses in the upcoming fluid increase the pumping head and also put back pressure on the engine and therefore as reflected in the operating pressure are multiplied by $\left(1 + \frac{a_1}{a_2}\right)$.

If friction losses are included the general relation (6) becomes:

$$P_4 = P_3 + \left(1 + \frac{a_1}{a_2}\right) (P_5 + f_2) - \frac{a_1}{a_2} [P_1 - (f_1 + f_p) - h_1 (d_2 - d_1)] \qquad (8)$$

When $d_1 = d_2$, this simplifies to:

$$P_4 = P_3 + \left(1 + \frac{a_1}{a_2}\right) (P_5 + f_2) - \frac{a_1}{a_2} [P_1 - (f_1 + f_p)] \qquad (9)$$

Also, if $\frac{a_1}{a_2} = 1$, then:

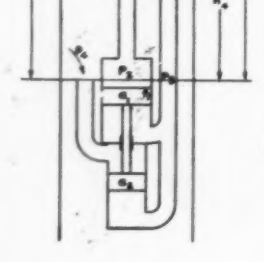
$$P_4 = P_3 + 2 (P_5 + f_2) - [P_1 - (f_1 + f_p)] \qquad (10)$$

And when $P_5 = 0$, then:

$$P_4 = P_3 - [P_1 - (f_1 + f_p + 2f_2)] \qquad (11)$$

The friction factor is usually not over 10 per cent of the operating pressure and can be estimated from friction-loss charts for the tubing strings or obtained directly from field tests. This latter method, in simplified form, consists of taking several readings of operating pressures at different pump speeds in as rapid sequence as possible so as to avoid a change in fluid level. These pressures are then plotted against strokes per minute. The range of speed should be as large as conditions will permit to spread the points. The curve through the plot of pressure against speed is projected back to zero which gives the operating pressure with the friction factor eliminated.

The productivity index also can be obtained directly from such data, the calculation being simply the difference between two of the producing rates divided by the difference of the corresponding bottom-hole pressures.



$P_1$=Operating pressure
$P_2$=Total pressure operating column=$d_1 h_1 + P_1$
$P_3$=Discharge column pressure=$d_2 h_2$
$P_4$=Submergence pressure
$P_5$=Back pressure
$h_1$=Operating column
$h_2$=Discharge column
$h_3$=Fluid level
$h_4$=Submergence head
$d_1$=Density factor operaging fluid lbs/sq in/ft
$d_2$=Density factor pumped fluid lbs/sq in/ft
$f_1$=Friction loss power fluid
$f_p$=Friction loss pump
$f_2$=Friction loss discharge column
$a_1$=Area engine piston
$a_2$=Area pump piston

*Fig. 6*

# BOOKS

**FLOWING GOLD—the Romance of Oil—by John J. Floherty. J. B. Lippincott Co., Philadelphia. 256 pp. $2.50.**

Oil men who are interested in learning how their industry appears to an outsider will find this book easy and interesting reading. Making no claims to detailed or technical knowledge, the author has collected together observations, impressions, and anecdotes gathered on brief visits to each type of principal oil installation—producing well, pipe line, tanker, refinery, and marketing outlet. Wherever he went, he found much that amazed him.

Those of the general public who read "Flowing Gold" certainly should finish with a greater appreciation of the role of the industry, both in war and in peace. One chapter deals with the construction of the big-inch lines, including a number of stories of incidents told by the pipe liners who built them. Another chapter tells of the heroism of tanker crews fighting submarines during the war. In another chapter titled "Miracles in Molecules" Floherty found still more glamour and fascination in a New Jersey refinery which he calls a "cathedral of pipes and power."

# QUESTIONS on TECHNOLOGY

**by W. L. Nelson**
Consulting Engineer

## Carrier Distillation Process

### Simplified Flow Diagrams

**What is the Carrier process? We believe it is a kind of vacuum process.—F.D.S.**

This process of distillation was introduced or named by Lummus Co., but the principles by which it operates have been employed by refiners for many years. In distilling high-boiling materials, several methods have been employed to promote vaporization. Among these are:

1. A high temperature as in delayed coking or a plain high-temperature distillation. Decomposition tends to occur to an extent which depends primarily on time of heating.
2. Vacuum may be employed to reduce the boiling range of the material.
3. Steam may be used to reduce the partial pressure and boiling range.
4. Flash or equilibrium vaporization lowers the vaporization temperatures by the partial-pressure lowering or "carrier" effect of the lower-boiling parts of the charge stock.
5. The Carrier process is an outgrowth of Item 4. In this process the lowest boiling part of the feedstock is recycled through the heating and distillation system so that its carrier effect or reduction in partial pressure is exaggerated or used over and over again.

Fig. 1 indicates how the Carrier process may be conducted. The overhead or light product is combined with the incoming feedstock and the entire mixture is heated and permitted to vaporize under equilibrium or flash conditions. The pressure at which the process is conducted is of no theoretical significance but inasmuch as exceedingly high boiling stocks are the ones that tend to suffer decomposition, the process is used mainly in connection with vacuum distillation. The "carrying effect" of light ends (either once-through or recycling) is indicated in Fig. 2 and Table 1. Five situations are illustrated. The first of these indicates the liquid temperature curve of a "batch" distillation (Curve 1) in which there is no carrying effect because the light ends are condensed and removed from the still as rapidly as they are vaporized and thus they are physically at a distance from the remaining material and can have no effect on the undistilled material. Curve 2 is the flash-vaporization curve. It indicates a larger percentage vaporized at a given temperature because the light ends are vaporized along with the remaining material and they exert a carrying effect. Curves 3, 4, and 5 indicate the conditions when light ends are recycled to the extent of 50, 100 and 200 per cent with respect to the fresh charge. Finally, a dotted-line curve is shown which is the customary laboratory batch distillation curve of vapor temperature versus per cent distilled. In preparing these curves, the material boiling up to 615° F. was considered as the "light ends" and it is the material that is recycled.

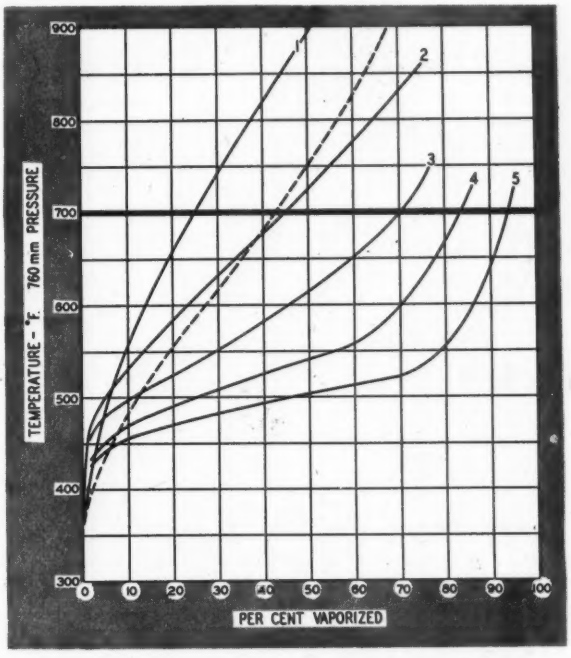



*Fig. 2—Variation curves illustrating Carrier process. 1—Liquid temperature in true-boiling-point batch distillation. 2—Flash vaporization. 3—Flash with 50 per cent recirculation of material boiling to 615° F. 4—Flash with 100 per cent recirculation. 5—Flash with 200 per cent recirculation.*

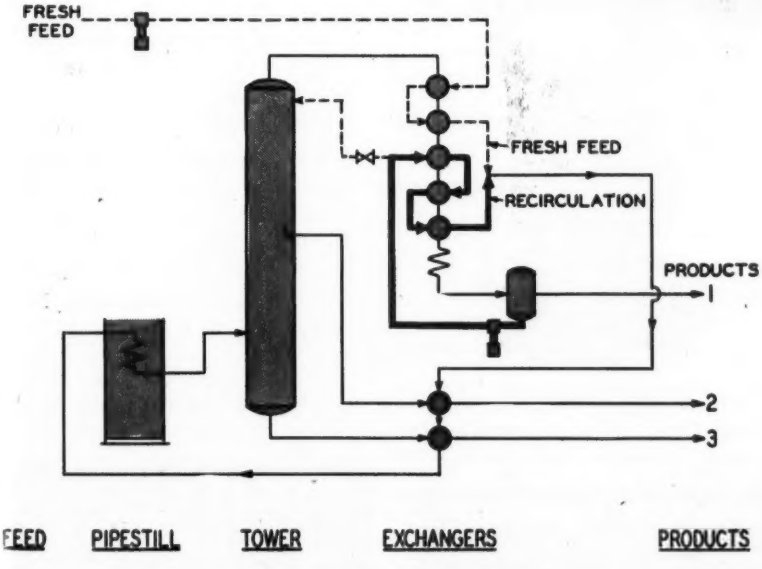



*Fig. 1—Simplified flow diagram of the Carrier process*

Examination of Fig. 2 shows that much larger percentages of the feedstock can be vaporized if some of the light material (up to 615° F. in this case) is recirculated. Table 1 shows the amounts vaporized at a maximum allowable temperature of 700° F. The percentage vaporized shown on Fig. 2 is based on the total material that is subjected to equilibrium, or in other words, it represents vaporization of the recirculated stock as well as the fresh feed. Percentages based on fresh

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feed have been computed as shown in Table 1.

**TABLE 1—Percentages of Feed Vaporized (see Fig. 2)**

| | Percentage Vaporized— Based on entire stock | Based on feed stock |
|---|---|---|
| T.b.p. batch distillation | 25 | 25 |
| Flash vaporization | 45 | 45 |
| 50 per cent recirculation | 70.5 | 56 |
| 100 per cent recirculation | 84 | 68 |
| 200 per cent recirculation | 94 | 83 |

Thus, only 25 per cent can be vaporized in a fractionating batch-type distillation conducted to a liquid temperature of 700° F., whereas by flash vaporization 56 per cent is vaporized and by recirculation (the Carrier process) of 200 per cent of low-boiling material (to 615° F.) 83 per cent of the fresh feed can be vaporized.

Although the extra vaporization permitted by the Carrier process is attractive, the process has its disadvantages. The pumping, heating, fractionation, and condensing of large amounts of recirculated material is expensive and it requires a larger pipe still, tower, and condensing equipment. The extra heat required is a formidable difficulty and hence successful operation of the process requires the use of elaborate heat exchange. Note the exchangers shown in Fig. 1.

## Dyes For Gasoline

**Can you give us a list of the dyes that are used for coloring gasoline, and how much is used?—W. S. P.**

Dyes are sold under many trade names and only the manufacturers can state the exact chemical constitution of them. Some of the common oil soluble dyes were listed by Egloff, Morrell and Truesdale in The Oil and Gas Journal, page 133, March 5, 1931.

| | | Lb. per 1,000 bbl. | |
|---|---|---|---|
| | Color* | Crkd. | Strun. |
| Oil Red No. 1 conc. | Red | 1.23 | 1.47 |
| Oil Red No. 0 | Red | .91 | 1.25 |
| Alizarin Blue, AS | Blue | 1.35 | 1.40 |
| Oil Blue MG | Blue | 3.5 | 2.45 |
| Oil Yellow AX | Yellow | 4.9 | 7.50 |
| Oil Yellow No. 2 | Yellow | 7.5 | 7.50 |
| Alizarin Cyanide Green | Green | 2.25 | 1.64 |
| Gasoline Green No. 2737 | Green | .42 | .42 |
| Oil Orange No. 30 | Orange | 1.33 | 1.37 |
| Oil Orange X conc. | Orange | 1.40 | 1.40 |

*Straightrun and cracked gasoline.

The fading time of the above, 50 hours or more, applies to exposure in sunlight.

In selecting a dye the material should be tried in the gasoline because some dyes produce a different color from that which their names would infer. Thus, some reds produce an orange color, blues a green or brown, and the greens a brown, blue, or even a yellow color.

# Watch Welding-Accident Hazards

***by Henry W. Boggess****

A FURTHER note on poisonous substances, poisonous gases, and exhaustion of oxygen in air should be made before discussing welding accident hazards.

One predominant poison hazard in welding is lead poisoning. It may occur when metal sheets, covered with lead paint, are being cut or scraped either by oxyacetylene flame or electric arc. Heat causes the lead in the paint to form a gas. Inhalation of such gas and fumes may lead to severe lead poisoning. Also welding or cutting brass or zinc may result in "zinc chills." Poisoning is more likely when work is done in confined areas with insufficient ventilation. Poisonous fumes and gases caused by welding or cutting should be carried

away forcibly. It has been alleged that carbon monoxide has been inhaled under unfavorable welding conditions. Where welding must be done in confined areas such as boilers or tanks, provision should be made for artificial ventilation such as exhaust fans. Fresh-air, blower-type masks can be used under such conditions as can newer type "air packs."

**Accident hazards.**—Gas fires may be caused by leaky, defective, or open valves in acetylene tanks. Without good ventilation, escaping acetylene will remain near its source and flash when ignited by torch or sparks. Such fires are difficult to extinguish; $CO_2$ (carbon dioxide) fire extinguishers are about the best for protection where welding is in progress.

Gas explosions may result where leaking acetylene is confined and contacts a source of ignition. Tank explosions are rare because of safety plugs that are standard equipment on all tanks. It should be realized, however, that full tank pressure is normally 1,800 to 2,000 psi. and that a very warm atmosphere or prolonged sunlight may mount this pressure to 2,500 psi. Use cool places for storage of tanks.

*Superintendent of personnel department, Sinclair Prairie Oil Co.

Valve explosions may occur when some styles of apparatus are used, especially if the operator allows it to get in bad condition. Oil and grease should never be applied to any tank valve, although a very small amount of pure glycerine is permissible.

Salient safety precautions in welding work should be committed to memory by all persons handling welding equipment:

1. Separate storage places should be provided for oxygen and acetylene cylinders.

2. Handle all cylinders carefully. Rough handling may cause leaks and consequent explosions. All leaky cylinders should be removed to open air and away from fire.

3. Do not use oil or grease on any part of equipment. Grease or oil will cause explosion when combined with oxygen under pressure.

4. Before connecting new cylinder or tank to regulator, always open valves to expel dirt that may be in fittings. Torch valves should be "bled" for a short time to expel any air from hose before lighting.

5. Regulators should be fitted properly to cylinders, preventing the crossing of threads and needle valve packing nuts should be screwed tightly to prevent leaks.

6. It is important that the difference in threads of cylinders be understood; right-hand threads for oxygen cylinders and left-hand threads for hydrogen cylinders.

7. When work is finished, shut off acetylene first, then oxygen.

8. Shut both valves immediately in case of back-fire: first the oxygen, then the acetylene. Blow pipe should be cool before relighting. Blow out carbon by turning on oxygen.

# BOOKS

PHYSICAL CONSTANTS OF HYDROCARBONS. Vol. III. A.C.S. Monograph Series No. 78. By Gustav Egloff. Reinhold Publishing Co., New York.

Vol. III of this series, dealing with the physical constants of the mononuclear aromatic—benzene type—hydrocarbons, has just been printed. Vol. I, on paraffin, olefin and other aliphatic hydrocarbons, was issued in 1939; Vol. II, on alicyclic hydrocarbons, was published in 1940. Before the end of 1946 it is expected that Vol. IV on the polynuclear aromatic — naphthalene and higher — hydrocarbons will appear, and within 2 years the last of the series, Vol. V, will be presented, dealing with fundamental relationships between the physical constants of hydrocarbons. From these data it is possible to predict the properties of hydrocarbons not yet isolated, the author states.

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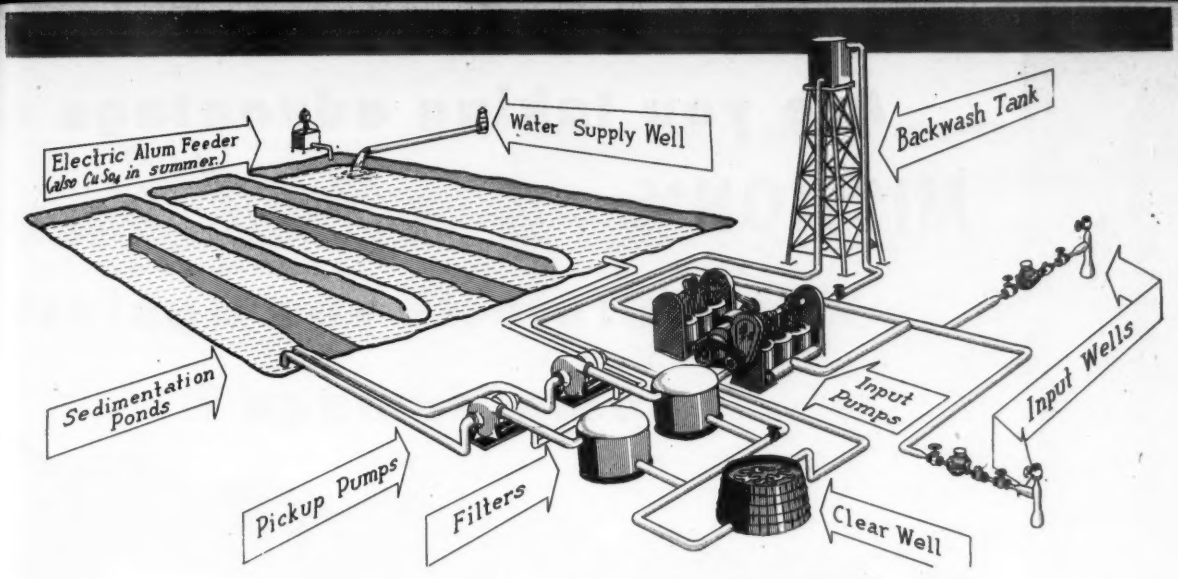
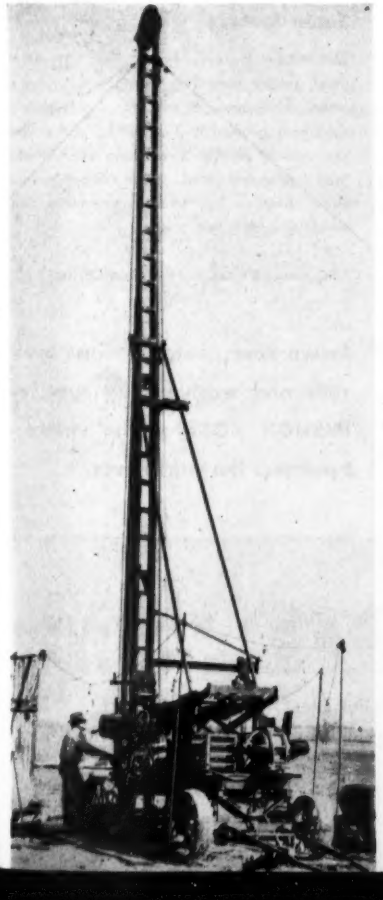



## *Mid-Continent's Shallowest*

# WATER-DRIVE PROJECT

## Affords Interesting Study of Contrast To Deeper, Flush-Type Oil Production

***by R. O. Bankson***



IN eastern Kansas in the McCune field a set of water-flood acreage has been under development and on production for the past 10 years. As to time alone, this probably is about the average total development-producing interval involved in much such work. As to the other features of the flood, however, almost everything was unusual or had some uncommon angle to it.

To start with, the operation is the shallowest flood project in the Mid-Continent area, and as far as it has been possible to ascertain, anywhere. Top of the producing sand in the southern part of the acreage averages only 210 ft. from the surface.

The project was among the first half-dozen operations that initiated secondary oil recovery by artificial water-drive application in the state—and from which has grown nearly 100 water-drive projects in eastern Kansas. It was the second project in the state where salt water obtained from specially drilled supply wells was used for injection.

*Top of page: Schematic layout of the McCune water-pressure plant. All the prime movers are electric motors*

*Left: Drilling the 300-ft.-depth oil and water input wells at McCune takes only 30 hours. The all-steel spudder is powered by an electric motor*

The properties are completely electrified. The drilling of input and producing wells is done by cable tools, and even the rig is electrified. The water drive is "pressured up" sufficiently so that the oil wells produce by natural flow. However, before the water injection started, the wells had declined in production to a point where they made only about ¼ bbl. of oil per day and could not be profitably pumped.

Most unusual thing about the "McCune" flood is the contrast it affords to deeper flush-type production. Hardly any other class of oil production short of mining or shaft operation could be more different from high-pressure flowing wells such as are drilled on 40-acre spacing and where the production is taken continuously with only one valve controlling the whole setup. At McCune, 102 wells are used per 40 acres. Of these there are about 56 water-input wells to every 46 oil wells. The wells are located on elongated five-spot arrangement, with the distances on the sides between like wells being 150 by 250 ft. The longer sides parallel the main axis or direction of the "shoestring" sand body. Reason for the close spacing is the high viscosity of the crude oil (16 centipoises at 70° F. reservoir temperature), and because the shallow depth stringently limited the input pressures to a point below where the overburden would be lifted.

### Summary of Production Data

All in all, the McCune project is not a large one in comparison with many water-flooding programs. So far, 75 acres have been drilled up and flooded, and the development of 60 additional acres planned for the near future will complete the work on the acreage owned in this area. To January 1, 1946, 217,402 bbl. of oil have been produced, and of this, 68 per cent, or 147,711 bbl., were recov-

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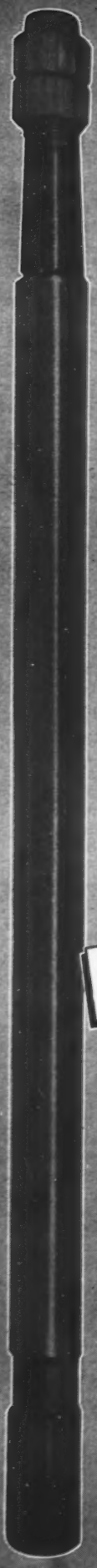

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The Mission Super-Surfaced* Rod lasts about twice as long as a File Hard Rod under normal conditions because after the Super-Surface* is finally worn away, a high strength, long-life File Hard Rod remains to give another long period of wear.

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The Mission Super-Surfaced* Rod lasts up to 4 times longer than File Hard Rods under corrosive conditions. Under such conditions ordinary rods pit badly. This pitting and grooving that results, quickly becomes so severe that the rods must be discarded. Mission Super-Surfaced* Rods, however, stay smooth even when salt or brackish wash water is used.

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ered from 34 acres. The water-flood recovery from the 34-acre parcel which now has been abandoned,* amounted to 4,345 bbl. per acre. Operation of the remaining 41 developed acres is continuing.

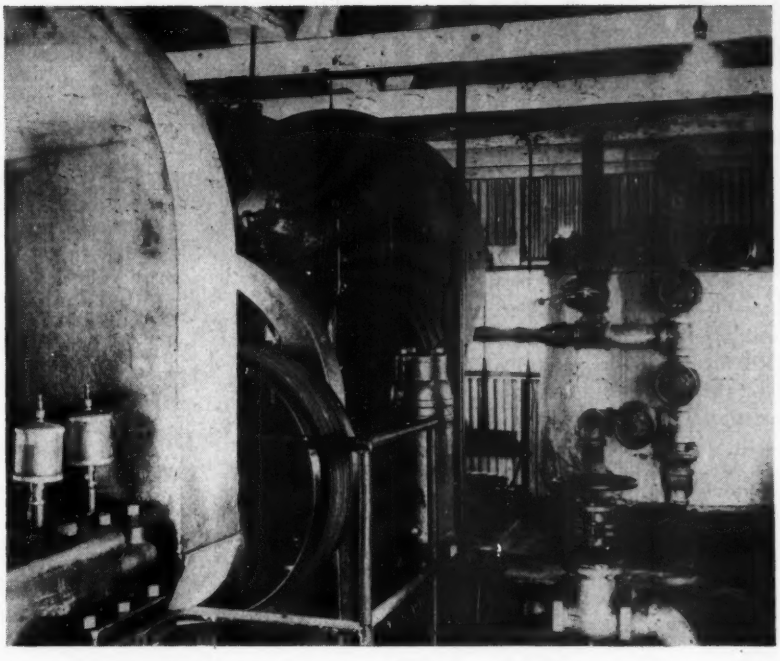
### Located in Crawford County

The McCune flood project is located in parts of Sections 18, 19, and 30-30s-22e, southwestern Crawford County, Kansas. The properties are located in the middle of the McCune "shoestring" field, which is 6 miles long in north-south direction, and mostly 600 ft. wide. Producing formation is a stray (locally, "McCune") sand of Pennsylvanian age. At the north end of the shoestring, top of the sand is 320 ft., and it rises to 185 ft. at the south end. Representative sand data are: Thickness 25 ft., permeability 75 millidarcys, porosity 20 per cent, oil saturation 43 per cent, water saturation 40 per cent (cable-tool cores).

The pool was discovered in January 1932. Some of the wells subsequently drilled flowed 50 to 100 bbl. for a very short time, but the natural production declined rapidly and soon thereafter vacuum was applied. What records there are of this primary production indicate that that recovery amounted to slightly less than 2,000 bbl. per acre.

The water-flood development was done in two sectors, the "north end" work starting in May 1937. This sector comprises the 34 acres previously mentioned, upon which producing operations were discontinued in 1945. In the other sector, ½ mile south, lie the 41 developed acres upon which flooding started in October 1941, and the adjacent 60 acres to be developed in the future.

*For a detailed description of this part of the program, see Wilhelm, C. J., Taylor, S. S., Holliman, W. C., Owens, E. O., "Use of Brine in a Kansas Field for Secondary Recovery of Oil," U. S. Bureau of Mines R. I. 3573 (June 1941).

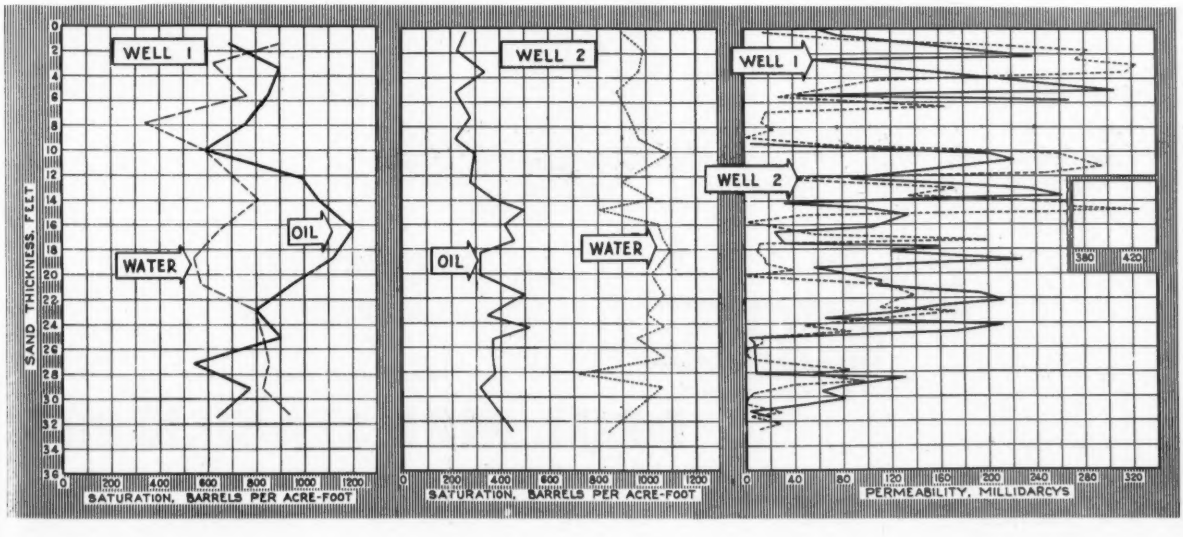


*Discharge side of one of the two electrically driven triplex pumps in McCune water-pressure plant. Sand-gravel pressure-type water filter seen at right*

Presentation of an over-all picture of the McCune water-flood project, covering the 10-year period between initial drilling and water injection, through to the now settled and routine producing operation, logically falls into three divisions: The drilling and completion of the wells, the water-injection system, and the producing operations.

Actual drilling of the wells takes only 30 hours and total completion time, including moving in, drilling, shooting, cleaning out, and moving away is done in approximately 50 hours. The drilling rig used is an all-steel spudder mounted on wheels and powered by a 10-hp., 440-volt-a.c. variable-speed electric motor. An electric-line pole system was constructed through the middle of the properties. As the shape of the productive acreage is long and narrow, electrical connections from the rig

*Results of an interesting test at McCune on "flooding efficiency," using actual wells a short distance apart. At left are representative oil-and-water-content data from a core analysis of the sand before flooding started. In the center section are the fluid-content data from a well drilled 12 ft. from an input well where 5,000 bbl. of water has been injected. This core showed a decrease in oil content averaging 522 bbl. per acre foot. Permeability profiles for the two wells are at right. (Figure modified from U. S. Bureau of Mines R.I. 3573)*

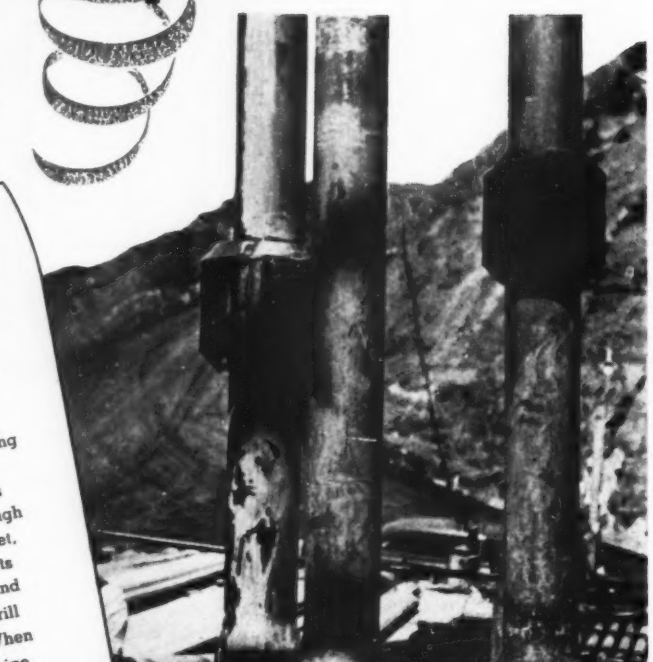


# Stabilizers *Vs* Torque!

★ DURING THE LAST EIGHT YEARS, various companies have had a great deal of trouble due to kinking drill pipe that was running inside casing without Drill Pipe Stabilizers or Casing Protectors on the complete string. One of the operators who uses Stabilizers and Protectors has explained the reason why.

## He wrote:

"This trouble has been eliminated by keeping all drill pipe stabilized inside the casing. It was found that 5-9/16" and 4½" drill pipe should have approximately 10" OD stabilizers on the pipe if it is being used inside 13⅜" casing; approximately 8" diameter inside 11¾" casing; or 7⅝" diameter inside 10¾" casing. When drill pipe is not stabilized in casing, the torque will run as high as the steam pressure, sometimes completely stopping the drill pipe. After installation of stabilizers or protectors, torque will drop back to normal. This torque builds up in all surface casing even though only 400' may be set. The more casing that is set, the worse the torque becomes. The torque starts building up in the drill pipe at the shoe joint and keeps working up the string. This kinks the drill pipe between the shoe joint and the Kelly. When torque gets to a certain high point, the drill pipe kicks loose and spins, causing the lower pipe to turn faster than the upper, loosening the tool joints and causing them to 'wobble' which results in broken pins and wash-out joints."



Many companies have discovered that it pays to keep Stabilizers or Protectors on all joints running inside the casing, plus enough out in the open hole to allow for the footage made between trips. Call your Patterson-Ballagh man *for complete (100%) drill pipe and casing protection!*

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## THE AUTHOR

**The author, who since 1941 has been manager of the oil division of Max B. Miller & Co., has spent 17 years in shallow-field production in Pennsylvania, Oklahoma and Kansas. He was born near Oil City, Pa., and attended high school in that city. He later attended University of Pittsburgh. He resides at Pittsburg, Kans.**

motor to the power lines can easily be made at any point with the 500 ft. of flexible connector cable accompanying the rig. The same mode of operation is used for the pulling unit on repair and remedial jobs, as it also is powered by a 10-hp. electric motor.

The injection wells are constructed with a joint of 7-in. o.d. surface pipe and a string of 2-in. line pipe run to the packer point in the sand. Injection wells are shot with 1½ qt. of nitroglycerin per foot. The shots are tamped with chat and detonated by electric wire equipment. Where zones of widely different permeability exist in thicknesses of as much as 5 to 10 ft., the shooting is selective, with heavier shots made opposite the tighter zones. The packer is cemented in place with 10 sacks of heavy slurry, and to assure that none of the cement runs down by the packer and to give definite packer points, the shot hole previously is filled with river sand. The loose sand is easily removed when the well is connected to the water-injection system, by running a 1-in. macaroni string inside the 2-in. and washing the sand out by the application of high water pressures and velocities. Previous to development, cable-tool cores were taken to determine general sand conditions.

In the first part of the McCune program, central powers were used to produce the oil wells, and after 4 years of pumping the project was put on flow. On the south end producing sector, however, the oil wells were initially equipped for flowing. In this case the construction is very similar to that of the water input wells, except the shots have been only 1 qt. per foot. The lateral oil lead lines from the individual oil wells are 1 in. and the oil-gathering system across the leases is of 2-in. size and increasing to 4 in. nearer the tank batteries. The tanks are of welded steel and of 100 and 200-bbl. size. The oil gathering system is laid on top of the ground.

As the McCune field has never had a pipe-line connection all the oil produced has been taken to market by tank-truck, an average haul of 30 miles. To offset conditions such as bad roads, inclement weather, and truck breakdowns, enough storage was set to maintain production for 2-week periods. While this condition is not as favorable as a pipe-line connection there has never been a time in the field's history when production was stopped for a lack of transportation.

During the pumping operation of the north project some trouble occurred from emulsions, especially in cold weather when the emulsions ran as high as 4 per cent. From the time that operation was put on flow there has been practically no emulsion trouble.

Previous to water flooding, the field had been on vacuum for several years. In the north area air was allowed to enter the sand when the vacuum plants were shut down. Subsequently considerable corrosion trouble was encountered in the producing wells and lead lines, and it is believed that the trouble was due to oxidation caused in this "satisfying" of the vacuum in the sand.

The vacuum plants on the south end were shut down 1 year previous to water flooding. During this year the casing heads of the wells were kept tightly closed, and as after a few months some of the wells started to make a little gas the vacuum was relieved with gas rather than air. There has been no corrosion problem in this latter operation.

### Arbuckle Salt Water Plus Produced Water Used for Injection

Source of water for input is from a supply well drilled to the Arbuckle (Lower Ordovician) limestone, topped at 890 ft. At the bottom of the well a 25-stage, 60-g.p.m. turbine is suspended on 3-in. tubing. A 7½-hp. electric motor at the surface is connected to the turbine by a 1-in. steel impellor shaft which is supported on bearings every 10 ft. Static level in the well is at 180 ft. and it will produce 2,000 bbl. per day of water at a drawdown of 70 ft. The water is a rather dilute brine, the total solids being only about 1,500 p.p.m. At the surface, approximately 25 lb. of alum are added per 1,000 bbl. of the supply water by a small chemical dry feeder actuated by a fractional horsepower electric motor, to promote flocculation in the sedimentation ponds.

The supply water from the well flows down an aeration ditch into an initial collecting pond (see cut) and then in succession passes through adjacent sedimentation ponds equipped with baffles. The produced water also is reinjected. It is gravitated from the receiving or separating tanks to the same point of entry as the supply water.

Two electrically driven centrifugal pumps pick up the water from the end of the last pond and pass it to two 6 by 6-ft. pressure filters, from which the water passes to two 100-bbl. "clear well" tanks connected to the suction of the water pressure plant. The plant consists of one 4 by 8-in. and one 4 by 9-in. stroke triplex pumps. Each pump is driven by a 20-hp. electric motor, through six V-belts. Currently a total of 2,500 bbl. of water per day are being pumped to water input wells located on 41 developed acres. This averages 45 bbl. per day per input well, and about 1.5 to 2 bbl. per day to each input well per foot of productive sand.

Copper sulfate, to the extent of about 20 lb. per week, is added during the spring and summer months to the supply water at a point where the water enters the first pond, to reduce growth of algae. Aeration of the supply water into the open system reduces the hydrogen sulfide in the supply water (about 26 p.p.m.) to approximately 4 p.p.m. for the mixed supply water—produced water at the clear wells. The bicarbonate content also is somewhat reduced, but not to the extent that calcium carbonate is not deposited in the injection lines. No serious trouble, however, has been experienced in carbonate deposition at the sand face of the injection wells. The oxygen content of the supply water (0.4 p.p.m.) is increased substantially. Tests at the clear well storage show about 7 p.p.m. While more oxygen increases the corrosiveness of the injection water, no serious troubles have been encountered, probably due to the protection afforded by the carbonate linings built up in the distribution system. Although the McCune system has functioned satisfactorily, there are, of course, a number of advantages concerned with the closed systems of handling water supply for injection purposes, and in fact, closed systems are employed in a number of eastern Kansas water-drive projects.

*(Continued on page 122)*

**TABLE 1—COST OF PURCHASED ELECTRIC POWER FOR PROJECT**

| Power used for production— | Hp. of units | Energy (kwh.) | Cost |
|---|---|---|---|
| 2—20-hp. motors driving 2 triplex pumps. Straight time | 36 | 19,400 | $234 |
| 2—5-hp. motors driving 2 centrifugal pumps. Straight time | 6 | 3,200 | 38 |
| 1—7½-hp. motor driving water-supply wells turbine pump. 10 to 14 hours per day | 8 | 2,100 | 34 |
| Total | 50 | 24,700 | $306 |
| Power used for development— | | | |
| 1—10-hp. motor driving drilling machine 8 hours per day | 8 | 1,000 | 24 |
| 1—10-hp. motor driving pulling machine, 1 to 3 days per week | 3 | 100 | 7 |
| Total | 11 | 1,100 | $31 |

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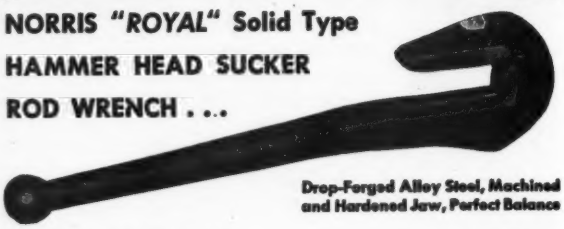

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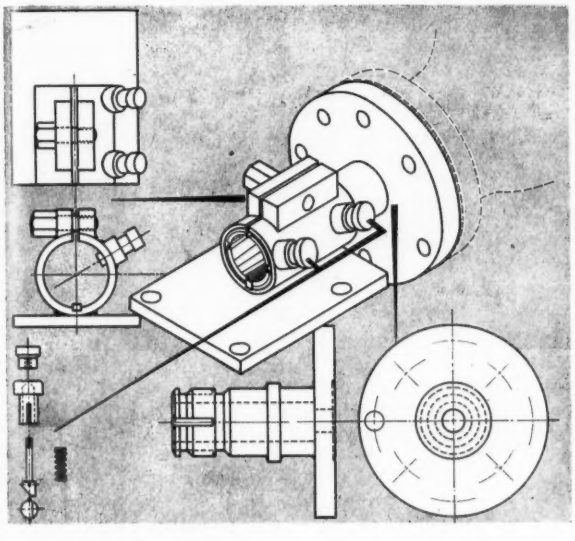
# PLANT PRACTICES

## Jig for Holding Regulator or Diaphragm Valves

THE jig for holding air-actuated diaphragm valves for repair is made up of a stationary housing having a clamp arranged so that a shaft to which the valve is attached may be positioned at one of four points spaced 90° apart. Attachment of the valve to the shaft is made by bolting it, with two bolts, to a flange in which a series of holes matching given bolt circles have been drilled; this flange is welded to the shaft. Valves may be placed in any of the four positions without removing it from the jig. Repair time is reduced by at least 25 per cent of that required when using nonpositioning jigs. Time is also saved by bolting the valve to the shaft and then inserting the shaft holding clamp which is attached securely to a work bench or table. *(This idea was submitted by J. E. Johnson, shop supervisor, in Humble Oil & Refining Co.'s "Coin Your Ideas" contest.)*



## Tool Rack De Luxe

THIS unusual tool rack is made of highly polished cedar, with the workmanship and appearance stemming from a highly skilled cabinet maker. The rack accommodates the tools necessary to service the battery of 800-hp. compressors in use in a gasoline plant in the KMA field.

## Light and Rugged Bench for Small Pipe

THE fabricated pipe bench shown in the photograph is constructed to accommodate small pipe sizes up to 2 in. Light in weight, the bench may be readily moved from job to job by hand if desirable. All of the main structural members are made of salvaged 2-in. pipe with 1-in. pipe for the secondary members and ¼-in. plate is used for the vise support and for the shelf upon which wrenches and other tools may be placed. A 10 by 12 by ¼-in. plate is welded to the left-hand leg for providing ample bearing area when larger size pipe is being made-up or threaded.

A 24-in. length of 2-in. pipe is welded to the backstay to form a handle for pulling the bench to a new location. When moving the bench by hand two men are normally required to do the job because the right-hand leg does not have a bearing plate which would serve as a skid and consequently the drag over soft areas is usually too great for one man. The bearing plate is purposely left off of the leg so that it may be placed in a slight depression to prevent the bench from moving around when it is being used with the larger pipe sizes.

# OPERATING IDEAS

## Emergency Pipe-Line Pump Has Many Uses

AN emergency pipe-line pump on a two-wheel trailer is in use by a major pipe-line company in Gray County, Texas. This unit has many uses. In case of failure of the stationary unit it can be transported by field pickup trucks and very rapidly connected up. It also is used in boosting pressure on the gathering system when necessary to move oil quickly. Another use is to pick up oil in case of line breakage or tanks leaking.

## Rack for Chemical Barrel

IN the Driscoll pool near Benavides, Tex., where Continental Oil Co. operates the entire field, at each tank battery is one of these barrel racks. It operates by releasing the handle on the side and pulling forward. This tips the barrel toward the horizontal and it is held there by slipping the handle in the notch. When through, the foot lever brings the barrel back upright.

## Device Measures Rainfall; Air-Hose Housing

THE three-legged device in the left of the picture is used in measuring rainfall. This has a 9-in. funnel-type mouth which empties into a 3-in. pipe. By gaging the water in the pipe and dividing by nine it gives a fairly accurate check on rainfall each 24 hours. This is at a large gas-compressor station at Dalhart, Tex. As this company has several river crossings in the vicinity the station is requested to report the rainfall to headquarters.

The cylinder at the right of the picture is a housing for the air hose used for tire maintenance for the company trucks and employes' vehicles. This is made of a 12-in. section of a 22-in. piece of line pipe. Top and bottom covering is made from steel floor plates. The top is hinged to give access to the air hose. Inside the container is a wheel rim around which the air hose is coiled to keep it from getting tangled when not in use.

## Camp Mail Box Made From Old Pipe

A PIECE of 12-in. light-weight pi 18 in. long has the back welde shut, with the front hinged with spring catch on the bottom. This turn, welded to a piece of 4-in. pi set in concrete, makes a roomy an water tight mail box for heavy ma Another smaller box which is a re ular U. S. mail box takes care of a first-class mail.

# Gamma Ray Inspection Method

## Used to Determine Loss in Wall Thickness Of Equipment Serving Gas-Distillate Wells

**by E. H. Short, Jr.**

ALONG with the intensive effort on the part of Greater Gulf Coast operators to alleviate corrosive conditions in distillate fields is an equally important program involving periodic inspection of the equipment serving gas-distillate wells. Most of the inspection work done in these areas has been the visual type which necessitates tearing down well-head connections and meter runs, and the taking up of flow lines. The inspection of loops requires that the loop be cut in several points. After a visual examination, it is welded back together.

Perhaps the most recent method of inspection to be adapted to the examination of equipment in gas-condensate areas is the Penetron. This method, or device, which has been used for some time in refinery inspection work, utilizes the gamma ray to determine not only the wall thickness of pipes and vessels, but also liquid densities, fluid levels, and the interface between two liquids.

According to operators who have had distillate-well equipment checked by the Penetron Service Co., Houston, the method has a number of desirable advantages as a means of determining the extent of generalized inside corrosion. The use of Penetron requires no preparatory work at a well where equipment is to be examined; nor is it necessary to shut the well in. The equipment used in making measurements of wall thickness is light and compact. It is brought to location in the back end of an automobile, but it can be carted by hand to points which are not accessible to cars. The Penetron can be placed in operation in a few minutes and a reading of wall thickness requires only 1 minute. The equipment used in field work consists of a control box, small gasoline-engine-driven generator and a tangential head.

In order to measure the wall thickness at a point on a vertical loop, for example, the tangential head is placed on the pipe as shown in an accompanying illustration. The radium source consisting of 1 mg. is at the end of the head. Some of the gamma rays penetrate the wall of the pipe, but these rays are not utilized in determining wall thickness. A portion of the radiation is termed back-scattered, and with this type the rays emerge on the same side of the pipe from which they originally entered. A detector, located in the handle portion of the head, measures the intensity of these back-scattered radiations. The intensity of the rays increases as a direct function of the wall thickness.

The current discharges or pulses produced by back-scattered radiation in the detector must be transmitted through a 100-ft. cable; therefore, they are increased in magnitude by a pre-amplifier, also located in the head.

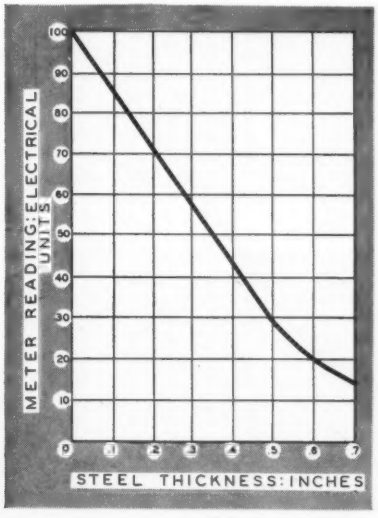



*Fig. 2—Calibration curve—illustrates how steel thickness is determined in inches from meter readings in electrical units*

*Fig. 1—Checking a leg of a 6-in. vertical expansion loop in a Gulf Coast distillate field*

Electric power for the Penetron is supplied by a 100-watt generator driven by a 1½-hp. gasoline engine.

The amplified pulses of current from the head are further amplified in the control box (which contains the measuring circuit and power supply) and also integrated to produce a direct current. An indicating microammeter measures the quantity of current produced, and the readings on the microammeter are indicative of wall thickness.

Actual wall thickness of the pipe is determined from a calibration curve, an example of which is shown. Calibration curves for various shapes of equipment are based on Penetron

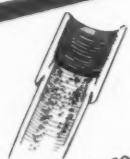
# the new OTIS tubing caliper

The new Otis Tubing Caliper is run under pressure on a steel measuring line. The instrument operates entirely on a mechanical, direct-contact principle to measure the maximum depth and location of corrosion pits in the tubing and indicate minimum tubing wall thickness.

## gives an accurate inside story



Photostats of the caliper logs, each log recording 2,250 feet of tubing with accuracy to 1/100 of an inch, are delivered to the operator with a comprehensive report on each well. The condition of the entire tubing can be quickly analyzed or each joint studied individually.



Surveys have been completed on 10,000 feet of tubing in a single day. In many cases operators are not only having surveys made in wells already producing, but are also having the Otis Tubing Caliper run in new strings to establish periodic checks on corrosion progress.

## of your tubing corrosion

Calipering is accomplished by means of six spring-loaded feeler arms pressed against the tubing wall and connected to a stylus which records their movement on a metal chart. The instrument has no packing glands or pressure tight joints. Thus, full well pressures are admitted to all parts.

Otis Pressure Control crews, consisting of an engineer, and a wire line specialist experienced in years of installing and maintaining sub-surface controls under pressure, are running the Otis Tubing Caliper.

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measurements of tubing and flat plates having known wall thicknesses.

### Examination of Gas-Distillate-Well Equipment in Place

Recently a Louisiana operator had the meter runs, expansion loops, and christmas-tree connections on 37 gas-distillate wells checked by Penetron. The measurements of wall thicknesses were completed in five 8-hour days. According to the operator, a visual inspection of this same equipment (which involves dismantling of equipment) would require the work of a seven-man crew for a period of approximately 40 days.

Inspection points are generally designated by company engineers who are experienced in spotting points at which the greatest amount of corrosion is liable to occur. Common locations where corrosion progresses at an accelerated rate include bends, tees, downstream side of chokes, and welds. In locating the effect of generalized corrosion in flow lines, Penetron measurements of wall thickness are taken at 75-ft. intervals. An inspection point means that four readings are taken—top, right side, bottom and left side.

As in the case of many new methods, a certain amount of skepticism is sometimes exhibited by the men in the field concerning the ability of the Penetron to accurately measure wall thickness. One foreman sealed both ends of a section of 4-in. pipe and challenged the Penetron operator to measure the wall thickness. The reading showed the wall thickness to be 0.350 in. on one side and the thickness of the wall directly opposite the point of the first reading was only 0.14 in. The pipe was then cut with a torch and the micrometer readings taken by the foreman were exactly the same as those indicated by the gamma-ray measurements.

In a Texas distillate field a more

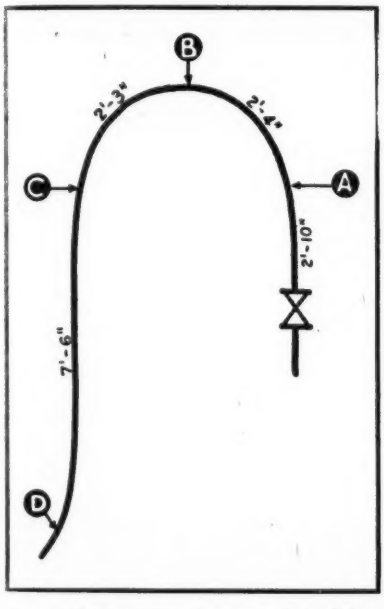


*Fig. 3—Inspection points on a lateral loop*

| Inspection point— | Wall thickness—Taken by Penetron (in.) | Wall thickness—Check points taken by Micrometer (in.) |
|---|---|---|
| **A—** | | |
| Top | .272 | ... |
| Right side | .284 | .285 |
| Bottom | .305 | ... |
| Left side | .284 | .287 |
| **B—** | | |
| Top | .272 | ... |
| Right side | .300 | .283 |
| Bottom | .285 | ... |
| Left side | .284 | .288 |
| **C—** | | |
| Top | .262 | ... |
| Right side | .290 | .292 |
| Bottom | .296 | ... |
| Left side | .268 | ... |
| **D—** | | |
| Top | .268 | ... |
| Right side | .260 | Pits |
| Bottom | .264 | ... |
| Left side | .284 | .282 |

*Fig. 4—As a test of the Penetron accuracy, a Louisiana operator had Penetron readings taken at points A, B, C, D (Fig. 3) on a lateral loop. The loop was then cut at the four points and the wall thickness checked by a micrometer*


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elaborate test of the Penetron accuracy was made before it was used in checking the equipment at all wells in the area. Readings were taken on a lateral loop at points indicated in Fig. 4. The loop was then cut at these points and checked by a micrometer. As shown in Fig. 5 these readings were practically the same as those indicated by the gamma ray measurements.

The Penetron, a product of the Texaco Development Corp., is manufactured and sold by Engineering Laboratories, Inc., Tulsa. Inspection work in the various distillate fields is being performed by Penetron Service Co., Houston.

## Mid-Continent's Shallow Water-Drive Project

*(Continued from page 113)*

Considerable ease of operation has been obtained in this project by electrification. Pressure plant operation requires about two man hours per day and there is no night operator. All motors are protected with standard fused switches and standard magnetic switches. The cost of purchased electric power for the project per month is shown in Table 1.

In the later (or south end) development of the McCune project, the drilling of the oil wells and injection wells was simultaneous. The oil wells were not produced until sufficient water had been injected to fill the void space created by the primary oil withdrawals, and to permit the formation to "pressure up." The shallow depth of the formation is a real hindrance to flooding work, as the input pressures definitely must be limited in order not to lift the overburden. On the south end acreage where the midpoint of the sand is of a depth of 220 ft., 300 psi. surface pressure has been applied to the input wells. Including the hydrostatic head, this amounts to 1.8 psi. per foot of depth, a figure somewhat on the high side of the range usually used in water-flooding practice. Although pressure-rate tests have indicated no lifting of the overburden at this degree of pressure application, the project has encountered its full share of trouble with bypassing and channeling of water from the injection wells. Where the bypassing occurred, not only have large quantities of water had to be injected, produced, and recycled, but there also the oil recovery has not been so good.

The water bypassing and channeling problem has had two primary causes. In parts of the acreage a highly permeable section was defined by the core analyses. This section generally was about 5 ft. thick and located slightly above the center of the sand section. In places, this section has permeability of about 300 millidarcys, as against an average of about 40 millidarcys for the rest of the formation. All things considered, the most practical thing to do was to accept the situation and inject into the permeable interval along with the rest of the sand body. Nevertheless, large quantities of water had to be produced. A second cause of water bypassing was the presence of a frangible lignite-shale section 10 to 12 ft. above the sand body. Apparently vertical fractures caused from the shooting of the injection wells permitted the injected water to pass out into the sand, up the fractures, around the packer setting, and thence into the overlying lignite-shale member wherein the water traveled on across to the producing wells. All told, these water bypassing troubles constituted a substantial part of the work involved in the operation, and various remedial measures have been tried with varying success.

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### Correction

In the June 15 issue, page 130, column 3, paragraph 1, the following is noted:

"Rating of Motor = Fluid Produced per Hour × Kw.hr. Consumption per Bbl. fluid × 1.34 × K."

This should read:

"Rating of Motor = Fluid Produced per Hour × Kw.hr. Consumption per Bbl. fluid × 1.34 ÷ K."

# Methods of Determining Differences in Elevation (continued)

### Procedure for Differential Levels

THE most common type of differential levels that requires the greatest degree of accuracy is that used in the establishment of bench marks. A bench mark is a permanent point of known elevation easily accessible and readily described. Suppose that the elevation of a bench mark at the bottom of a hill is to be determined from the known elevation of a bench mark at the top of the hill (Fig. 1). The instrument is taken to a spot A in the general direction of $BM_2$ and set up so that a rod held on $BM_1$ can be seen from A. Since the maximum length of sights in differential leveling is usually 250 to 300 ft., this means that the instrument is set up at point A about 250 to 300 ft. from $BM_1$. The instrument is leveled in the following manner. Two adjacent leveling screws such as 1 and 2 of Fig. 2, are released so that two opposite leveling screws, 2 and 4, can be pointed in the general direction of the bench mark (Fig. 2a). The telescope is then turned so that it is parallel to this opposite pair of screws, 2 and 4. By means of this opposite pair of leveling screws the bubble is brought within the graduated part of the tube. The instrument is then turned through 90° in either direction over the other opposite pair of leveling screws, 1 and 3 (Fig. 2b). Using this pair of screws, the bubble is brought to within a division or so of the center of the tube. The telescope is then turned with the objective lens toward the rod held on the bench mark ($BM_1$) and focused on the rod (Fig. 2c). Now the bubble is brought exactly to the center of its tube by means of the first opposite pair of leveling screws 2 and 4. The rod is now read to the nearest 0.01 ft. The bubble is checked to make certain that it has remained centered while the rod was read. This method assures that the least time will elapse between leveling and reading, and hence there is less likelihood of the bubble moving from its central position. In Fig. 1 the first backsight reading is 1.22 ft. From this figure it can be seen that if the backsight reading is added to the elevation of $BM_1$ the height of the instrument will be known. Hence in differential leveling a backsight is defined as a rod reading taken on a point of known elevation, which, when added to the elevation of the point, will give the elevation of the line of sight. It is recorded as H.I. (Height of Instrument).

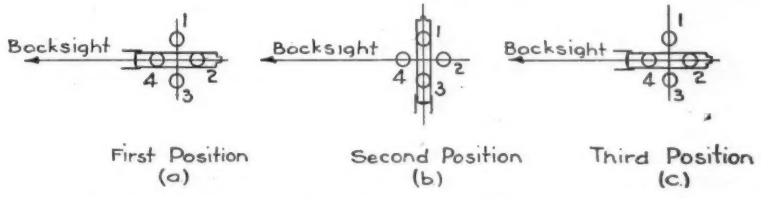



*Fig. 2—Showing positions of level telescope as instrument is leveled preparatory to taking a backsight reading*

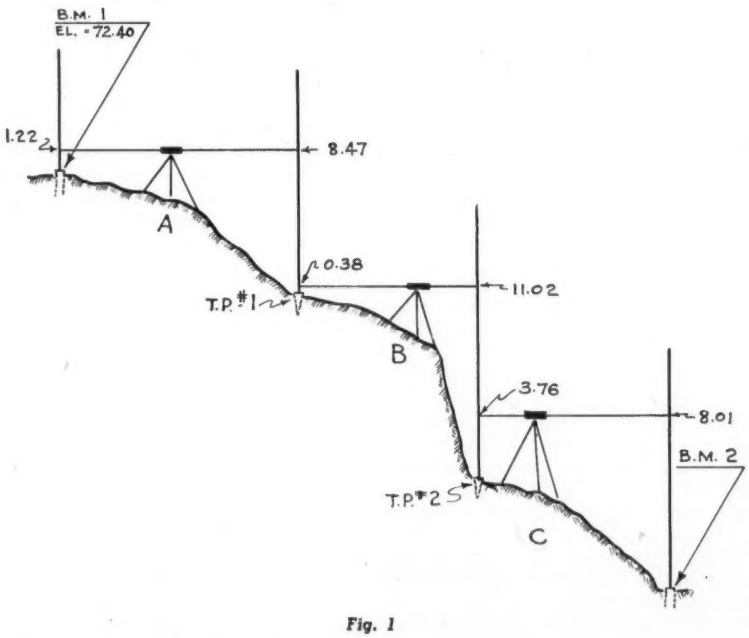



*Fig. 1*

After the backsight reading is taken, the rodman paces the distance forward to the instrument. He then proceeds forward in the general direction of $BM_2$ a like distance, to select a site at which to place the turning point. In proceeding downhill as illustrated in Fig. 1 the objective is to obtain a foresight reading as near the top of the rod as possible without consuming too much time. This is done most readily by the rodman walking out along the contour of the slope, or nearly so, then swinging down the hill in an arc until the rod is sighted near its top. The turning point is set and the rod is held on it. The telescope is now pointed at and focused on the rod held on the turning point (T.P. 1 of Fig. 1). It is unlikely that the bubble will be in the center of the tube or

**Series prepared by Dr. E. A. Stephenson, head of petroleum engineering school, and Prof. D. Don Haines, department of civil engineering, University of Kansas**

# Engineering Fundamentals (Continued)

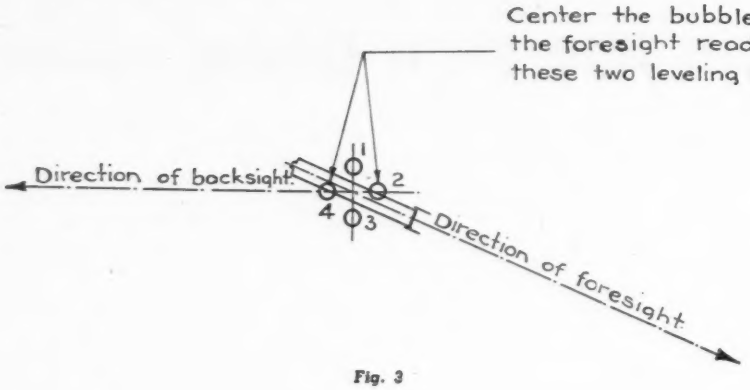



*Fig. 3*

that the telescope will be parallel with an opposite pair of leveling screws. However, the opposite pair of leveling screws most nearly parallel to the line of sight is used to bring the bubble exactly to the center of the tube (2 and 4 of Fig. 3). The rod is read, the bubble is checked and the foresight reading is recorded. By referring to Fig. 1 again it is seen that if the foresight reading of 8.47 ft. is subtracted from the known elevation of the line of sight the elevation of the turning point (T.P. 1) is found. Hence, a foresight reading is a rod reading taken on a point of unknown elevation, which, when subtracted from the H.I. will give the elevation of the unknown or forward point.

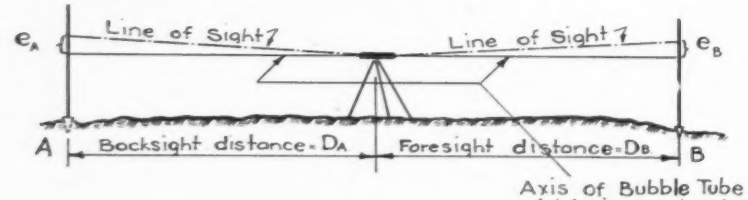



*Fig. 4—Equal backsight and foresight distances eliminate errors of maladjustments*

The instrument is now picked up, carried forward and set up at a new position, B, in Fig. 1. With the instrument at B the procedure is repeated as outlined above when the instrument was at A. The only difference is that the backsight reading is taken at $TP_1$ rather than at $BM_1$. The whole process is repeated over and over again as many times as are necessary in order to carry the levels from $BM_1$ to $BM_2$. However, in order to check the work, the levels should be carried on to some other bench mark whose elevation is known or they should be rerun back to $BM_1$ thus closing the circuit.

Below is shown a typical set of level notes for the data illustrated in Fig. 1.

| Point | +S. | H.I. | —S. | Elev. |
|---|---|---|---|---|
| $BM_1$ | 1.22 | 73.62 | .... | 72.40 |
| $TP_1$ | 0.38 | 65.53 | 8.47 | 65.15 |
| $TP_2$ | 3.76 | 58.27 | 11.02 | 54.51 |
| $BM_2$ | | | 8.01 | 50.26 |
| | $\Sigma = 5.36$ | | $\Sigma = 27.50$ | |

Note that all backsight readings are added and all foresight readings are subtracted; hence the sum of the former represents the total gain in elevation between the two benchmarks and the sum of the latter represents the total loss in elevation between the same two benchmarks. Their difference should give the net gain or loss in elevation. In the notes above these sums are shown as +5.36 ft. and —27.50 ft. respectively, representing a net loss in elevation of 22.14 ft. The value is the same as that obtained by taking the difference between the recorded elevations of the two benchmarks. This is known as "proving the notes," and it indicates that no error has been made in the calculations.

By keeping backsight distances and foresight distances approximately equal for each setup of the level the sum of the backsight distances and the sum of the foresight distances will be balanced between benchmarks. Since the bubble is centered for each rod reading any error caused by the line of sight not being parallel to the axis of the bubble tube will be eliminated. This is true because equal error will be introduced in both the backsight and the foresight reading, and, since backsight readings are added and foresight readings are subtracted the errors will cancel each other. Fig. 4 will help explain the way in which these errors balance out.

All rod readings taken on an extended rod should be made as the rod is "waved." In waving a rod the rodman rocks it slowly backward and forward through the vertical as it is observed by the levelman. The horizontal crosshair will appear to move up and down on the face of the rod as the rod is waved. The rod will be in the vertical plane when the lowest value on the rod is sighted (Fig. 5). The error caused by not holding a rod vertically varies with the angle of inclination and with the magnitude of the rod reading.

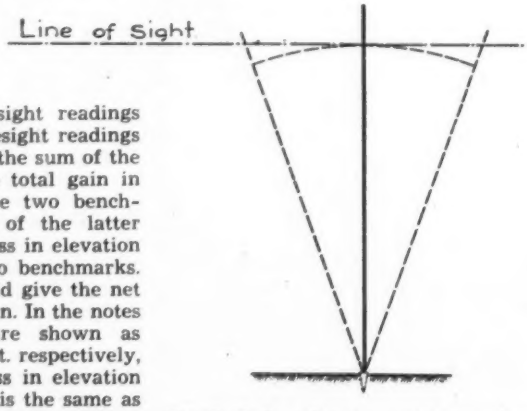



*Fig. 5—Rod reading is a minimum when rod is in a vertical position*

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

# Fin-Tube Exchanger Units

A COMMON type of fintube equipment consists of a double-pipe exchanger containing an inside tube that has longitudinal fins (see Notebook No. 81, February 16, 1946, page 129). High over-all transfer rates can be had by putting the low-film-rate fluid through the fin side of the equipment. Such equipment has gained in importance because the units can easily be shifted from service to service in caring for new plant conditions.

### Transfer Rate

The film-transfer rate on the fin side of the tube can be read with reasonable accuracy from Fig. 1 in Notebook No. 91, May 4, 1946, even though this figure was originally prepared for flow inside ⅝ and 1¼-in. tubes. A correction for the very large area of the fins as compared with the inside area of the tube is necessary. It might be expected that the fin area and the inside tube area could be used directly in customary heat-transfer formulas but such is not the case because conduction along the metal fin and into the tube wall proper must be taken into account. This may be done by the use of Fig. 1 which permits computation of what may be called the "equivalent" area of the fins (and outside wall) for various common fin tubes. In practice, the "equivalent" fin-side area is a factor which is divided into the fin-side transfer rate and fin-side fouling factor as follows:

$$H = \frac{1}{\frac{1}{A_f H_f} + \frac{R_f}{A_f} + \frac{1}{h_i} + R_i}$$

in which H is the over-all transfer rate based on the inside area, $A_f$ is the equivalent fin-side area compared with 1 sq. ft. of inside area, $h_i$ and $R_f$ are the fin-side transfer rate and fouling resistance, and $h_i$ and $R_i$ are the film-transfer rate and fouling resistance for the inside of the tube.

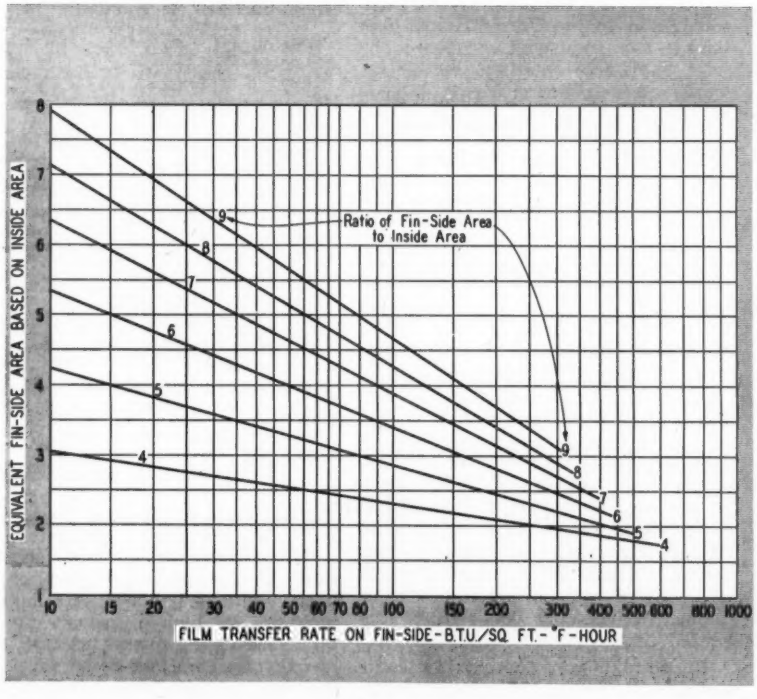



*Fig. 1*

**Example.**—One type of 24-fin tube has 50.5 sq. ft. of external finned surface and an internal surface of 8.4 sq. ft. Thus the ratio of actual finned surface to internal surface is 6.0.

Crude oil (viscosity 1.3 at estimated film temperature of 230° F.) flows at 4 ft. per second through the tube and kerosene (viscosity 0.3 centipoises at 340° F.) flows at 0.5 ft. per second around the fins. According to Fig. 1, Notebook No. 91, April 27, 1946, the film-transfer rate of the crude oil is 187 and for the kerosene is 60. Notebooks Nos. 94 and 95, May 25 and June 1, 1946, indicate approximate fouling factors of 2.5 for the crude oil and 1.5 for the kerosene.

For a fin-side film rate of 60, Fig. 1 indicates that the equivalent fin-side area is 3.83 sq. ft. for each square foot of inside area. The over-all transfer rate is:

$$H = \frac{1}{\frac{1}{3.83 \times 60} + \frac{0.0015}{3.83} + \frac{1}{187} + 0.0025} = 80$$

This over-all rate does not seem so large when based on the finned surface, that is, 80 ÷ 6 = 13.3.

Had a plain double-pipe exchanger been used the rate would have been only about 38.

### Friction Losses

Pressure drops may be computed by the common methods for flow inside of tubes except that the hydraulic diameter (D) should be used, and 20 or 25 ft. should be added to the finned length for each return bend in the exchanger. Hydraulic diameter is defined as four times the cross-sectional area of flow divided by the perimeter of the fin side (fins plus outside of tube plus inner surface of shell pipe).

No. 99 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

# Natural Gas

## Three United Gas Pipe Line Applications to Be Heard

WASHINGTON. — A hearing was scheduled to be held here this week before the Federal Power Commission in consolidated proceedings involving three applications by United Gas Pipe Line Co. for permission to construct additions to its system in Mississippi and Louisiana.

Because of increased demands for gas in the Texas and Louisiana Gulf Coast area and in Mississippi, Alabama, and Florida, United Gas Pipe Line has proposed to extend its system to the Baxterville and Gwinville fields in Mississippi. The Baxterville extension will require about 10 miles of 12¾-in. line costing an estimated $281,696, and the Gwinville extension, 13½ miles of 10¾-in. line costing an estimated $263,018.

To tap Hayes gas field, in Louisiana, United Gas Pipe Line is asking authority to build a 16½-mile extension of 12¾-in. line and to install additional compressor units at its Iowa station. Estimated cost is $635,405. United told FPC it has made a contract with Gulf Refining Co. under which Gulf will furnish the gas company with supplies from Baxterville, Gwinville, and Hayes fields.

In connection with the extensions in Mississippi, the company also has proposed to increase compressor capacity of its Hattiesburg station by 1,000 hp. at a cost of $211,400 and to construct a 3-mile extension to its Laurel loop, using 12¾-in. pipe at a cost of $62,461.

The third United application requests authority to construct and operate an extension of about 1 mile of 2-in. line to Richton, Miss., at a cost of $7,294. The extension will be used to deliver gas to United Gas Corp. for resale in Richton.

## FPC Certificate Next Step For Reynosa Pipe Line Co.

CORPUS CHRISTI, Tex.—Reynosa Pipe Line Co. officials are planning to ask the Federal Power Commission for a construction certificate to proceed with their section of the proposed 170-mile gas pipe line from Hidalgo County, Texas, to Monterrey, Mexico.

FPC two weeks ago authorized Reynosa Pipe Line to export and sell up to 50,000,000 cu. ft. daily to Gas Industrial de Monterrey but said the authorization is contingent upon the filing of an application for certificate of public convenience and necessity for construction of the line.

Delivery of pipe for the 30-mile $500,000 Texas section of the line is not expected before next April, it is reported. The line will extend from near Weslaco, Tex., to the international bridge at Hidalgo-Reynosa where it will join the 140-mile Mexican line to be constructed by Gas Industrial de Monterrey. The line will carry gas from five wells in La Blanca field, three in South Weslaco field, and one in Santa Maria field near Mercedes. All the wells are in Hidalgo County.

Gas Industrial de Monterrey will purchase the gas at the border from Reynosa Pipe Line under a 10-year contract and deliver it to Monterrey for use by a limited number of industrial consumers who are subscribers to the Mexican company's stock. FPC export authorization stipulated that Reynosa Pipe Line and La Gloria Corp. must at all times give preferential service to persons and municipalities in the United States over that to Gas Industrial.

## Carbon Black Production During 1945 Sets Record

WASHINGTON. — Production and sales of carbon black totaled 1,052,798,000 lb. from 58 plants during 1945, up 31 per cent over 1944, according to the Bureau of Mines. Total gas consumed in the manufacture of the carbon black set a new record of 431,830,000,000 cu. ft., a 21-per cent increase over 1944.

Production of carbon black in 1945 was boosted by the completion of several new plants. The production of contact-process blacks, which declined from 1940 through 1943, gained 30 per cent over 1944, to 538,539,000 lb. Furnace-black output continued its upward trend, increasing 33 per cent, to 514,259,000 lb. in 1945, or 49 per cent of total production. Texas' plants produced 69 per cent of the United States total.

The 58 plants operated in 1945 compared with 54 in 1944. Two plants, one roller in Kansas and one channel in Louisiana, were not operated in 1945. Five new channel plants, two in New Mexico, one in Oklahoma, and two in Texas; and one new furnace plant in Texas began operations during the year.

Production of carbon black during the month of March 1946 from 57 plants, totaled 85,049,616 lb., the Oklahoma Interstate Oil Compact Commission's fourth edition of its new statistical bulletin shows. Texas 44 plants recovered 64,098,979 lb., or 75.4 per cent of the total in March. Louisiana followed, with 14,878,913 lb. from six plants, for 17.5 per cent of the total; Oklahoma produced 3,542,000 lb. from four plants, and three plants in Kansas produced 2,529,724 lb.

Consumption of natural gas at these 57 plants was: Texas, 1,307,950,000 cu. ft.; Louisiana, 70,640,000 cu. ft.; Oklahoma, 44,000,000 cu. ft., and Kansas 40,802,000 cu. ft.

## New Fuels Fail to Alarm Industry, Boothby Says

NEW YORK.—The gas industry is not alarmed by scientific developments made in the field of competitive fuels, including solar radiation and atomic energy, Everett J. Boothby, president of the American Gas Association, said here.

Boothby said the gas industry must keep accurately informed and thoroughly abreast of all such scientific developments. The results of the gas industry's greatly expanded research program are evidence of its ability to "march in the front rank of the technical parade," he added.

## U. S. Carbon Black Plant Sought by Two Bidders

DALLAS.—Two offers have been made for the government-owned carbon black plant at South Eunice, N. M., one of which will be forwarded to Washington with a recommendation for acceptance, according to officials of the regional War Assets Administration office here.

The plant was partially completed at a cost of about $1,400,000. Included in the property are 638 acres of land, 240 burner buildings, 33 miscellaneous buildings, and 8 miles of 20-in. gas line. Carbon black was never produced in the plant.

## Compressor Report Released

WASHINGTON.—Rotary gas compressors for medium pressures and large volumes, and reciprocating compressors for high-pressure ranges up to 3,500 atmospheres, were noteworthy wartime developments in the German gas compressor industry, according to L. P. Jehle, investigator for the Joint Intelligence Objectives Agency. His report has been published by the publication board, Department of Commerce.

# REFINING

## Republic Oil Refining Plant Completing Solvent Unit

Work is reported near completion on an addition to the new solvent unit at the Texas City, Tex., plant of Republic Oil Refining Co. Capacity of the refinery is 25,000 bbl. daily crude charge, and 22,000 bbl. daily cracking.

Last winter, the plant shut down its No. 1 topping unit for conversion into a naphtha rerun unit for solvent production. The solvents to be made were 140°-200° and 200°-240° F. fractions, with a charge of 2,000 bbl. daily of straightrun gasoline. The conversion was handled by the maintenance department, and the unit put on stream early in February.

Work was begun late in May on the addition consisting of a small tower which is to be used to separate a portion of the 240°-340° F. primary-tower bottoms into two fractions—a 240°-290° and a 290°-340° cut.

The latter cut is the desired fraction, and the other will be sent to motor-gasoline blending at present. The charge is to be about 800 bbl. daily. This addition requires the moving of a small tower installation of three pumps, exchangers, instruments, necessary pipe for the unit, and a run-down line for the 290°-340° fraction, according to F. I. Lutteman, refinery process engineer.

The charge to and the yields from the solvent unit are:

| | |
|---|---|
| Charge, straightrun gasoline .... | 2,200 b/d. |
| 140°-200° F. cut ..... | 530 b/d. |
| 200°-240° F. cut ..... | 725 b/d. |
| 290°-340° F. cut ..... | 240 b/d. |

In converting the unit last winter, changes required were:

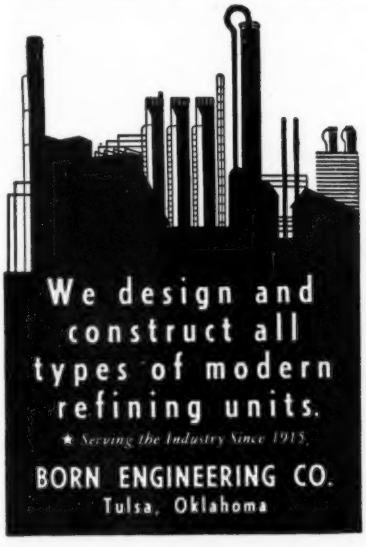
1. Tie in the straightrun gasoline stabilizer as a prefractionator to remove the $C_4$ to 140° F. fraction.
2. Install a steam reboiler on the secondary fractionator.
3. Connect a small furnace as a fired reboiler on the primary fractionator.
4. Tie in additional condenser surface on the primary and secondary towers to take care of added reflux loads.
5. Installing larger and additional pumps to take care of increased circulation loads.
6. Laying new product rundown lines.
7. Rearranging instrument controls and piping to take care of the new operation.

## WAA Proposed Sale of Butadiene Plants

WASHINGTON.—War Assets Administration last week recommended to Congress the sale of 28 Government-owned synthetic rubber plants, including 10 for the production of butadiene from petroleum.

WAA said it will list the plants immediately in an effort to attract offers on all of them before the end of the year. The recommendation covering the 28 plants followed a similar recommendation the previous week for the sale of the 10 styrene, neoprene, and butyl rubber plants.

The Government's Interagency Policy Committee on Rubber last week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issued a report recommending immediate steps to place butadiene and copolymer synthetic rubber plants in private hands. The committee pointed out that unless a sale policy is determined promptly, none of them may be disposed of before Congress convenes in 1947. The committee added certain facilities may become obsolete unless they are disposed of soon due to rapid technological developments in the synthetic rubber industry.

WAA in recommending sale of the 28 plants predicted demand for synthetic rubber will continue through early 1947 and then decline gradually for at least 2 years before finding its natural level in competition with natural rubber or reaching a point where the Government will be impelled to take action to keep the synthetic industry in operation.

The 28 plants comprised the 10 petroleum butadiene plants, 15 copolymer plants for the production of GR-S butadiene-styrene rubber, and 3 alcohol butadiene plants. They represent $488,000,000 of the Government's total $670,357,000 investment in the synthetic rubber industry.

The accompanying table lists the Government's petroleum butadiene plants.

| Location and operator— | Investment | Rated capacity—long tons per year |
|---|---|---|
| Lake Charles, La., Cities Service Co. | $17,029,000 | 55,000 |
| Baytown, Tex., Humble Oil & Refining Co. | 18,790,000 | 30,000 |
| Port Neches, Tex., Neches Butane Products Co. | 56,693,000 | 100,000 |
| Los Angeles, Shell Union Oil Corp. | 19,917,000 | 55,000 |
| Houston, Sinclair Rubber, Inc. | 30,889,000 | 50,000 |
| Baton Rouge, La., Standard Oil Co. of New Jersey | 8,762,000 | 15,000 |
| Borger, Tex., Phillips Petroleum Co. | 35,682,000 | 45,000 |
| El Segundo, Calif., Standard Oil Co. of California | 7,859,000 | 18,000 |
| Toledo, Ohio, Sun Oil Co. | 7,361,000 | 15,000 |
| Los Angeles, Southern California Gas Co. | 12,189,000 | 30,000 |
| Total | $215,171,000 | 413,000 |


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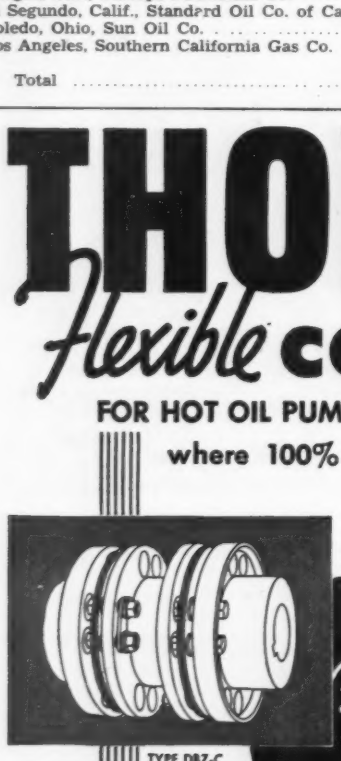


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## Root Petroleum Seeking U. S. Cracking Plant

SHREVEPORT, La.—Root Petroleum Co. is negotiating with Reconstruction Finance Corp. for purchase of the catalytic cracking plant at El Dorado, Ark., which it operated during the war.

The plant is of the fluid type and has a charging capacity of 5,000 bbl. daily. Alkylation production is 1,500 bbl. daily, and isomerization production 450 bbl. daily. Root Petroleum's El Dorado refinery has a crude capacity of 15,500 bbl. daily, and a cracking capacity of 12,750 bbl. daily.

Officials of the company said it is planned to remodel the plant and produce premium gasoline. Built at a cost of $6,000,000, the unk value of the plant was estimated at $230,000.

## Ohio Standard to Build Toledo Settling Basin

TOLEDO, Ohio.—Standard Oil Co. ((Ohio) is planning construction of a $500,000 concrete settling basin at its 20,000-bbl. daily capacity refinery here.

Designed to decrease pollution in Maumee Bay, the basin, a separator of the latest type, will handle water used for cooling purposes in the refinery and also rain water runoff, according to company officials.

## Increase Reported in Net Stocks of Penn Crude

A gain in net stocks of Pennsylvania crude oil from 1,718,721 bbl. March 31 to 1,894,848 bbl. at the end of April was reported this week by the National Petroleum Association.

The association's summary is compiled from reports of all pipe line and refining companies. The April stock figure compared to 1,666,542 bbl. at the end of April 1945.

Oil held as cracking-plant charging stocks rose from 246,639 bbl. at the end of March to 308,629 bbl. at the end of April.

# PIPE LINES

## Engineering Staff Formed For California Gas Line

LOS ANGELES.—Two California gas companies moved rapidly last week with preparations for construction of their section of the Texas-California pipe line following approval of the $70,000,000 project by the Federal Power Commission.

The two companies, Southern California Gas Co. and Southern Counties Gas Co.—subsidiaries of Pacific Lighting Co.—set up headquarters for the engineering staff at Eighth and Flower streets here with B. M. Laulhere, manager of engineering services, assigned to direct operations of the pipe line staff.

F. S. Wade, president of the Southern California company, said, "Despite the current unpredictable production capacity of the steel industry, we are making every effort to have the pipe line in operation during the winter of 1947-48."

The two California gas companies will build a 214-mile 30-in. line from the Colorado River east of Blythe, Calif., to Santa Fe Springs, Calif., at an estimated cost of $16,225,000. The other part of the 1,200-mile line, extending from Dumas, Tex., to near Blythe, will be built by El Paso Natural Gas Co.

Laulhere is being assisted by J. B. Reddick as staff engineer; Milton J. Binckley, location engineer; and Herbert A. Secor, office engineer. R. B. Kipp has also been assigned to the staff as an office engineer. Supervising field engineering is G. C. Stamm. Structural engineering is being handled by Frank Smith; and Bruno F. Bohnhardt has been assigned as design engineer. John B. Minor is handling right-of-way. George Norman is chief of the field party.

"In anticipation of a favorable decision from FPC, we have already started the preliminary work on the project," Wade said. "The necessary pipe has been ordered, and surveys of the route are under way. . . . We are indeed fortunate to be able to augment California supplies by connection with the extensive reserves in Texas and New Mexico."

## Pipe Line Company Organized

LOUISVILLE, Ky.—A new company, Bell-Knox Pipeline Co., Pineville, Ky., has been incorporated to build principally natural gas pipe lines. The new company with $30,000 capital was organized by Charles B. Stacy, J. M. Brooks, Sr., J. M. Brooks, Jr., Floyd Bell, Alva Bell, and William Scalf.

## ICC Figures Show Drop In Pipe-Line Movement

WASHINGTON. — Interstate Commerce Commission statistics show interstate pipe-line movement of crude and products during the first quarter dropped 11.3 per cent from the corresponding 1945 quarter, while revenues declined 8.8 per cent in the same period.

Figures in the report generally reflected the transition from war to peacetime movement. Largest percentage decline in revenue was reported by Project Five Pipe Line Corp., down 55.3 per cent. Principal traffic decline was reported by Hum-


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ble Pipe Line Co., down 10,310,378 bbl. with a drop in revenue of 7.6 per cent. Sinclair Refining Co. showed a revenue decline of 17.5 per cent on a traffic decrease of 3,276,116 bbl. Continental Oil Co. reported a 54 per cent revenue increase on a 36 per cent gain in volume.

Of the 44 reporting firms, 30 reported decreases in revenue for the period, and 14 reported increases. The companies reported they moved 490,796,938 bbl. during the period against 553,311,425 bbl. in the corresponding 1945 period.

## Kansas-Nebraska Gas Co. Extending Kansas Lines

WICHITA, Kans.—Kansas-Nebraska Gas Co. is completing construction of new pipe lines extending south from Otis field to connect with new gas wells.

A 9-mile 8-in. line already has been built from Otis field to the northwestern corner of Pawnee Rock Township, and the company is using 6-in. pipe to extend the line 10 miles to the Christianson well, south of Dundee. Connections will be made to four gas wells and laterals will be extended to others as they are completed.

## Kansas Runs Drop

Kansas pipe line runs during the week ended June 17 dropped 5,439 bbl. daily from the 1946 record high total established the previous week. Runs totaled 277,493 bbl. daily, compared to 282,932 bbl. daily the previous week. June allowable for the state is 260,000 bbl. daily.

## T. G. & T. Authorized To Buy Four Stations

WASHINGTON.—Tennessee Gas & Transmission Co., Houston, has been authorized to purchase from Reconstruction Finance Corp., at an estimated price of $6,607,550, four compressor stations with an aggregate of 33,600 hp., the Federal Power Commission announced last week.

The four stations are located in Washington County, Mississippi, Hardeman and Robertson counties, Tennessee, and Montgomery County, Kentucky, and were leased from Defense Plant Corp. in 1945 under temporary permit from FPC as a war emergency measure. These stations are now operated as part of the company's pipe line system and additional gas reserves have been connected to meet requirements for continued operation.

FPC also gave the company permanent authorization to operate about 2,380 ft. of 8-in. transmission line extending from a main line valve in Harris County, Texas, to a point of connection in Harris County with the 10-in. Katy-Satsuma pipe line of United Gas Pipe Line Co. Temporary authorization for construction of this line was authorized in 1945 for the purpose of obtaining supplemental supplies of natural gas from United on an emergency basis.

## Pipe Line Held Insufficient

AUSTIN.—Because of limited pipe line facilities, the Texas Railroad Commission last week ordered Yates field in Pecos County placed on a 22-day producing schedule. The order was made effective June 1.

In setting the state oil allowable for July, the commission cut the Yates field allowable 7,877 bbl. daily to a total of 42,000 bbl. daily, rated pipeline capacity. Ohio Oil Co. has asked that the allowable be reduced to 36,541 bbl. daily.

## Montana Line Proposed

WASHINGTON.—An application by Montana-Dakota Utilities Co., Minneapolis, for permission to construct and operate 28 miles of 10¾-in. gas transmission line in Valley County, Montana, has been set for hearing July 1 in Minneapolis by the Federal Power Commission. The project is estimated to cost between $250,000 and $300,000.

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Fort Madison, Iowa

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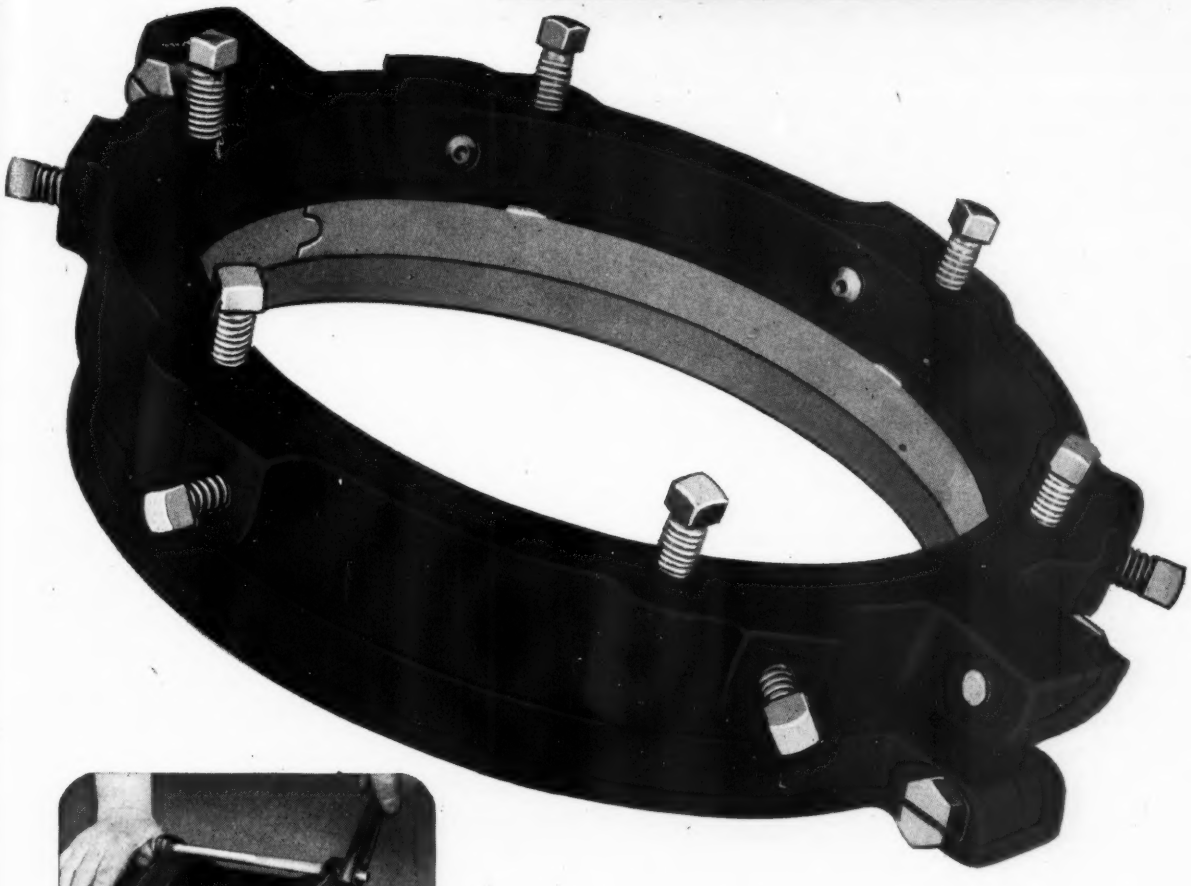

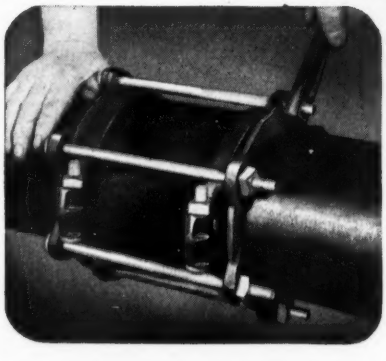

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# STATISTICS and

## WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 22, 1946

| | Total of all wells | | | | | Cum. to date | | Wildcat completions and discoveries | | | | | Cumulative total, 1946 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Comp. | Oil | Gas | Dry | Footage | 1946 | 1945 | Oil | Dist. | Gas | Dry | Total | Oil | Dist. | Gas | Dry | Total |
| New York | 32 | 16 | 0 | *16 | 45,521 | 746 | 619 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pennsylvania | 82 | 41 | 8 | †33 | 125,611 | 1,910 | 1,795 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| West Virginia | 16 | 0 | 8 | 8 | 45,109 | 333 | 379 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ohio | 28 | 6 | 11 | 11 | 77,633 | 542 | 409 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 10 | 17 | 29 |
| Indiana | 8 | 6 | 0 | 2 | 14,857 | 152 | 85 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 9 | 11 |
| Kentucky | 8 | 3 | 0 | 5 | 15,855 | 214 | 203 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 16 | 18 |
| Illinois | 54 | 28 | 0 | ‡26 | 128,989 | 992 | 771 | 0 | 0 | 0 | 12 | 12 | 20 | 0 | 0 | 170 | 190 |
| Michigan | 20 | 7 | 0 | 13 | 44,179 | 366 | 362 | 0 | 0 | 0 | 7 | 7 | 10 | 0 | 5 | 116 | 131 |
| Kansas | 40 | 17 | 6 | 17 | 128,459 | 931 | 758 | 0 | 0 | 0 | 7 | 7 | 14 | 0 | 0 | 115 | 129 |
| Neb., Mo., Iowa | 0 | 0 | 0 | 0 | 0 | 9 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 |
| Oklahoma | 51 | 24 | 5 | 22 | 179,568 | 1,110 | 1,145 | 3 | 0 | 0 | 9 | 12 | 35 | 0 | 19 | 136 | 190 |
| Texas | 147 | 99 | 5 | 43 | 603,534 | 3,783 | 3,395 | 5 | 1 | 0 | 21 | 27 | 92 | 18 | 12 | 598 | 720 |
| North Central | 62 | 38 | 0 | 24 | 149,133 | 1,348 | 993 | 1 | 0 | 0 | 9 | 10 | 25 | 0 | 0 | 238 | 263 |
| West | 24 | 21 | 0 | 3 | 102,519 | 782 | 901 | 1 | 0 | 0 | 2 | 3 | 24 | 0 | 1 | 82 | 107 |
| Panhandle | 6 | 2 | 2 | 2 | 17,816 | 168 | 253 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 |
| Eastern | 12 | 9 | 2 | 1 | 72,135 | 353 | 153 | 0 | 0 | 0 | 1 | 1 | 10 | 0 | 1 | 44 | 55 |
| Gulf Coast | 32 | 24 | 1 | 7 | 214,359 | 858 | 783 | 1 | 1 | 0 | 4 | 6 | 23 | 16 | 6 | 131 | 176 |
| Southwest | 11 | 5 | 0 | 6 | 47,572 | 274 | 312 | 2 | 0 | 0 | 5 | 7 | 10 | 2 | 4 | 98 | 114 |
| Louisiana | 23 | 16 | 0 | 7 | 142,220 | 628 | 743 | 1 | 0 | 0 | 3 | 4 | 29 | 5 | 3 | 79 | 116 |
| Northern | 13 | 11 | 0 | 2 | 40,603 | 340 | 165 | 1 | 0 | 0 | 1 | 2 | 6 | 0 | 0 | 45 | 51 |
| Southern | 10 | 5 | 0 | 5 | 101,617 | 288 | 308 | 0 | 0 | 0 | 2 | 2 | 23 | 5 | 3 | 34 | 65 |
| Arkansas | 3 | 2 | 0 | 1 | 8,542 | 84 | 81 | 0 | 0 | 0 | 1 | 1 | 3 | 0 | 0 | 16 | 19 |
| Mississippi | 3 | 0 | 0 | 3 | 19,706 | 117 | 168 | 0 | 0 | 0 | 3 | 3 | 1 | 0 | 1 | 32 | 34 |
| Southeastern States | 2 | 0 | 0 | 2 | 16,795 | 21 | 24 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 18 | 18 |
| Montana | 15 | 6 | 3 | 6 | 30,499 | 140 | 150 | 2 | 0 | 0 | 2 | 4 | 9 | 0 | 0 | 15 | 24 |
| Wyoming | 4 | 3 | 0 | 1 | 6,646 | 79 | 87 | 0 | 0 | 0 | 1 | 1 | 8 | 0 | 3 | 21 | 32 |
| Colorado-Utah | 7 | 5 | 0 | 2 | 51,697 | 61 | 15 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 8 | 11 |
| New Mexico | 9 | 7 | 0 | 2 | 43,310 | 174 | 218 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 19 | 22 |
| California | 25 | 17 | 2 | 6 | 86,653 | 863 | 1,103 | 0 | 0 | 0 | 3 | 3 | 4 | 0 | 2 | 108 | 114 |
| Total United States | 577 | 303 | 48 | 226 | 1,815,383 | 13,255 | 12,252 | 11 | 1 | 0 | 73 | 85 | 237 | 23 | 55 | 1,498 | 1,813 |
| Total previous week | 580 | 323 | 68 | 189 | 1,906,869 | 12,678 | 11,718 | 9 | 0 | 6 | 69 | 84 | 226 | 22 | 55 | 1,425 | 1,728 |
| Total June 23, 1945 | 534 | 282 | 57 | 195 | 1,735,343 | | | 6 | 0 | 2 | 77 | 85 | 259 | 9 | 62 | 1,587 | 1,917 |

Service wells included: *16, †33, ‡1.

## MARKET QUOTATIONS

(Quotations shown here are f.o.b. plant in tank cars and in cents per gal. as of last Monday.)

### REFINERY GASOLINE

| | | |
|---|---|---|
| Octane (A.S.T.M.) | 78-78½† | 73-75 |
| Mid-Continent* | 6.500-6.750 | 5.750-6.000 |
| Texas Gulf Coast | 6.375 | 5.750 |
| New York Harbor | 7.375 | 6.375 |
| California | | 6.00-6.875 |

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

### NATURAL GASOLINE

| Grades: | 26-70 | 18-55 |
|---|---|---|
| Oklahoma (Group 3) | 3.250 | 3.900 |
| N. Texas (f.o.b. plant) | 2.750 | 3.300 |
| N. Louisiana (f.o.b. plant) | 3.125 | 3.750 |
| California | 4.875 | 5.500 |

### CRUDE-OIL PRICES

Representative posted schedules per bbl.

| | |
|---|---|
| East Texas | $1.35 |
| Conroe | 1.53 |
| Tepetate, Louisiana, avg. grav. | 1.30 |
| Illinois Basin | 1.47 |
| Pecos County, Texas | 1.05 |
| Bradford, Pennsylvania | 3.10 |
| Van, Van Zandt County, Texas | 1.18 |

Note: Exclusive of subsidy.

### GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

| Gravity— | Signal Hill, Calif. | Oklahoma, Kansas | Gulf Coast Texas | West Tex.* |
|---|---|---|---|---|
| 18-18.9 | $0.90 | | | |
| 19-19.9 | .94 | | $1.16 | $0.80 |
| 20-20.9 | .98 | $0.95 | 1.18 | .82 |
| 21-21.9 | 1.02 | .97 | 1.20 | .84 |
| 22-22.9 | 1.06 | .99 | 1.22 | .86 |
| 23-23.9 | 1.10 | 1.01 | 1.24 | .88 |
| 24-24.9 | 1.13 | 1.03 | 1.26 | .90 |
| 25-25.9 | 1.17 | 1.05 | 1.28 | .92 |
| 26-26.9 | 1.21 | 1.07 | 1.30 | .94 |
| 27-27.9 | 1.25 | 1.09 | 1.32 | .96 |
| 28-28.9 | 1.28 | 1.11 | 1.34 | .98 |
| 29-29.9 | 1.30 | 1.13 | 1.36 | 1.00 |
| 30-30.9 | 1.33 | 1.15 | 1.38 | 1.02 |
| 31-31.9 | | 1.17 | 1.40 | 1.04 |
| 32-32.9 | | 1.19 | 1.42 | 1.06 |
| 33-33.9 | | 1.21 | 1.44 | 1.08 |
| 34-34.9 | | 1.23 | 1.46 | 1.10 |
| 35-35.9 | | 1.25 | 1.48 | 1.12 |
| 36-36.9 | | 1.27 | 1.50 | 1.14 |
| 37-37.9 | | 1.29 | 1.52 | 1.16 |
| 38-38.9 | | 1.31 | 1.54 | 1.18 |
| 39-39.9 | | 1.33 | 1.56 | 1.20 |
| 40 and above | | 1.35 | 1.58 | 1.22 |

*Includes Lea County, New Mexico.

### A.P.I. REFINERY REPORT

Week ended June 15, 1946

(Figures in thousands of barrels)

| | Dly. crude runs to stills | Stocks—Gasoline | Stocks—Distillate | Stocks—Residual |
|---|---|---|---|---|
| East Coast | 761 | 22,894 | 10,955 | 8,306 |
| Appalachian | 150 | 3,491 | 600 | 394 |
| Ill., Ind., Ky. | 748 | 19,058 | 4,921 | 3,635 |
| Okla., Kan., Mo. | 389 | 8,137 | 2,117 | 1,271 |
| Inland Tex. | 212 | 3,024 | 350 | 689 |
| Tex. Gulf Cst. | 1,206 | 14,140 | 5,821 | 5,315 |
| La. Gulf Cst. | 334 | 3,997 | 1,791 | 1,335 |
| N. La., Ark. | 57 | 1,841 | 406 | 191 |
| Rocky Mt. | 140 | 2,231 | 485 | 781 |
| California | 802 | 14,636 | 8,136 | 23,998 |
| Total 6-15-46 | 4,799 | 93,449 | 35,582 | 45,915 |
| Total 6- 8-46 | 4,827 | 94,146 | 33,958 | 45,938 |
| Total 6-15-45 | 4,957 | 87,105 | 30,282 | 39,808 |

### CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

| Week ended— | Bbl. of Crude* |
|---|---|
| June 15, 1946 | 220,106,000 |
| June 8, 1946 | 218,589,000 |
| June 16, 1945 | 221,932,000 |

*Excludes unrefinable Calif. stocks.

# TRENDS

## DAILY AVERAGE PRODUCTION FOR WEEK

| | June 22 crude oil | B. of M. June demand | June 15 crude oil |
|---|---|---|---|
| Alabama | 1,150 | 750 | 1,150 |
| Arkansas | 78,650 | 79,000 | 79,200 |
| California | 880,150 | 848,000 | 876,250 |
| Colorado | 29,700 | 26,000 | 28,630 |
| Eastern | 67,500 | 64,200 | 63,700 |
| Florida | 250 | 250 | 250 |
| Illinois | 207,600 | 210,000 | 207,400 |
| Indiana | 19,900 | 18,000 | 19,600 |
| Kansas | 277,450 | 255,000 | 282,900 |
| Kentucky | 31,200 | 31,000 | 29,850 |
| Louisiana | 386,450 | 380,000 | 386,350 |
| North Louisiana | 90,350 | ..... | 90,250 |
| South Louisiana | 296,100 | ..... | 296,100 |
| Michigan | 45,150 | 46,000 | 50,130 |
| Mississippi | 63,150 | 57,000 | 63,450 |
| Montana | 26,800 | 22,000 | 26,800 |
| Nebraska | 750 | 800 | 750 |
| New Mexico | 97,600 | 98,000 | 97,600 |
| Oklahoma | 388,500 | 380,000 | 383,150 |
| Texas | 2,243,750 | 2,050,000 | 2,257,750 |
| District 1 | 19,650 | ..... | 19,650 |
| District 2 | 155,650 | ..... | 155,650 |
| District 3 | 515,400 | ..... | 515,400 |
| District 4 | 229,600 | ..... | 229,600 |
| District 5 | 43,950 | ..... | 43,950 |
| East Texas | 326,000 | ..... | 326,000 |
| District 6 | 107,350 | ..... | 107,350 |
| District 7B | 32,400 | ..... | 32,400 |
| District 7C | 28,450 | ..... | 28,450 |
| District 8 | 566,450 | ..... | 580,450 |
| District 9 | 132,400 | ..... | 132,400 |
| District 10 | 86,450 | ..... | 86,450 |
| Wyoming | 109,150 | 104,000 | 109,500 |
| Total United States | *4,954,850 | 4,670,000 | 4,964,410 |

Change from previous week down 9,560

Total production January 1-June 22 .....††806,797,289 bbl.
Same period last year (crude, plus condensate)... 828,978,650 bbl.

*Not incl. 26,200 bbl. condensate. †Incl. 4,425,000 bbl. condensate. ‡Revised.

**CRUDE-OIL STOCKS** 220,106,000 bbl. as of June 15—up 1,517,000 bbl. One year ago 221,932,000 bbl.

**GASOLINE STOCKS** 93,449,000 bbl. as of June 15—down 697,000 bbl. One year ago 87,105,000 bbl.

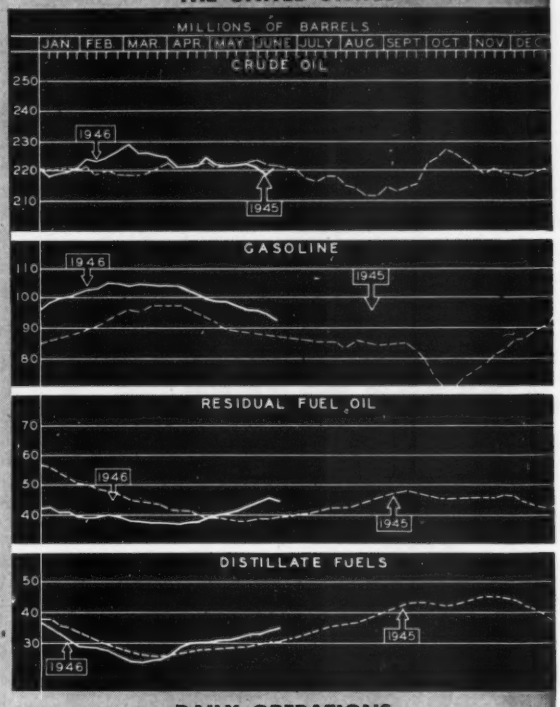
**RESIDUAL FUEL-OIL STOCKS** 45,915,000 bbl. as of June 15—down 23,000 bbl. One year ago 39,808,000 bbl.

**GAS OIL AND DISTILLATE STOCKS** 35,582,000 bbl. as of June 15—up 1,624,000 bbl. One year ago 30,282,000 bbl.

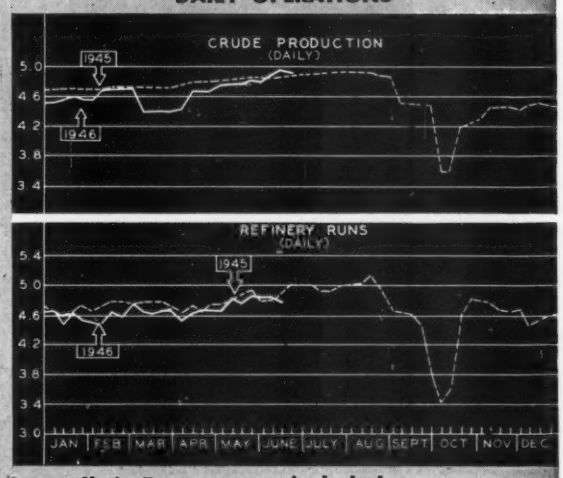
**CRUDE-OIL PRODUCTION** 4,954,850 bbl. as of June 22—down 9,560 bbl. One year ago 4,894,650 bbl.

**REFINERY RUNS** 4,799,000 bbl. daily week ended June 15—down 28,000 bbl. One year ago 4,957,000 bbl.

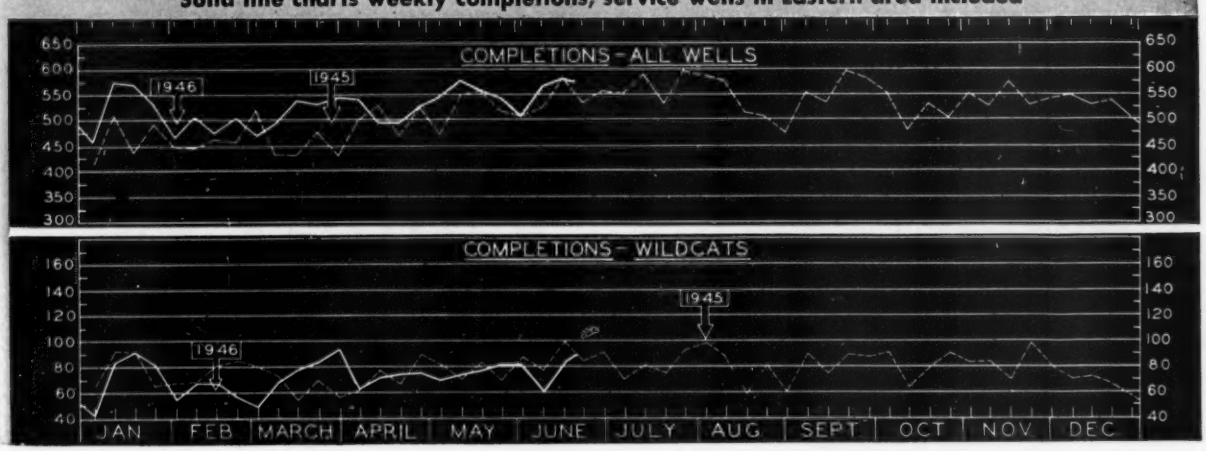
## OIL STOCKS IN THE UNITED STATES

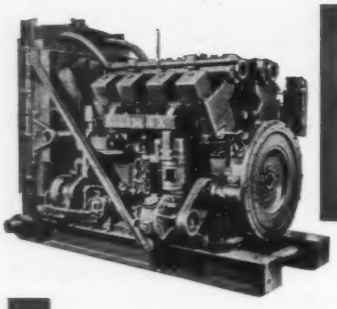



## DAILY OPERATIONS




**Solid line charts weekly completions, service wells in Eastern area included**





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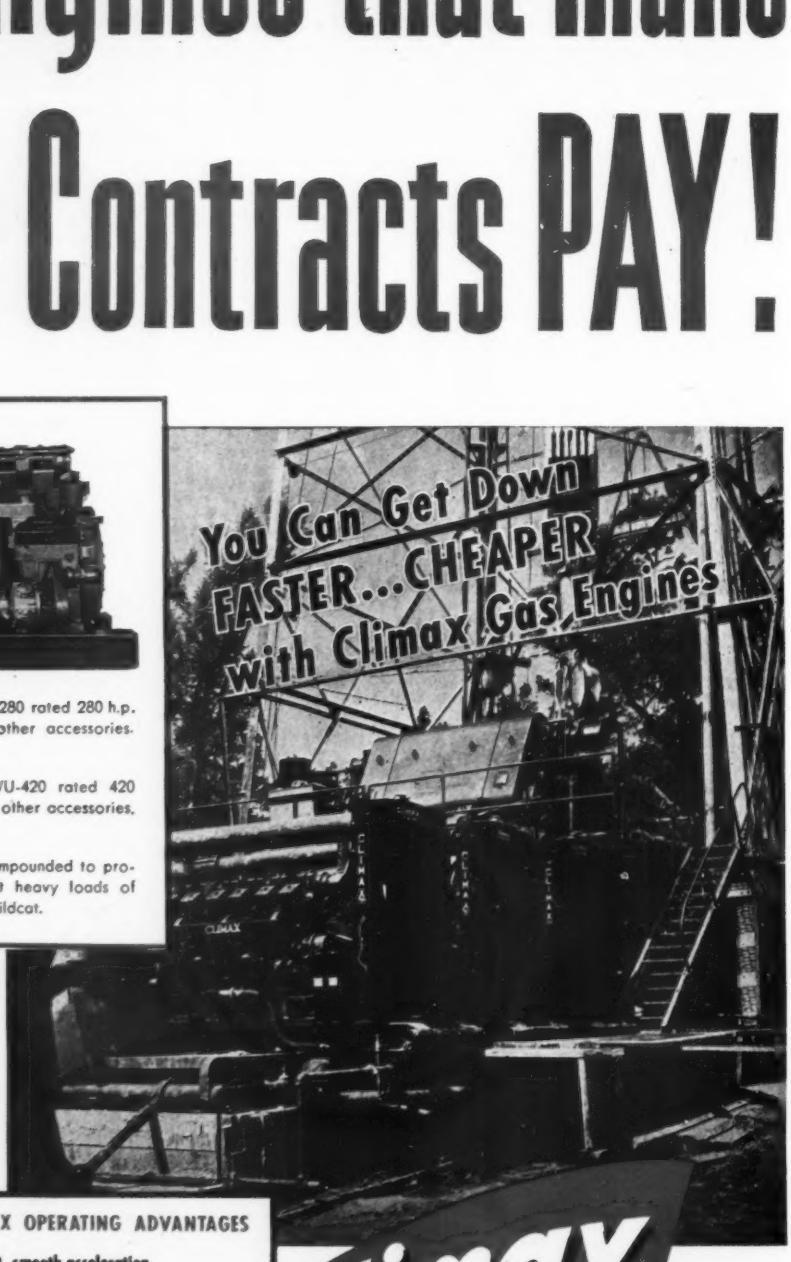
ABOVE: Heavy duty, compact Climax VU-420 rated 420 h.p. at 1100 r.p.m. with radiator, fan and other accessories. 12 cylinder, 4 cycle, "V" type.

AT RIGHT: 3 Husky Climax VU-420's (compounded to produce 1250 h.p.) speed-up drilling—hoist heavy loads of drill pipe fast—on this deep East Texas wildcat.

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# Exploration and Drilling

## Show in West Florida Test?

SOME idea of the close watch being kept on far-flung wildcat tests can be gained from events last week. Many companies were keeping an eye on Shell Oil Co., Inc.'s, third test at Jumping Pound, north of Calgary, Alberta, Canada, which is nearing the critical depth, when suddenly reports came in that a comparatively unnoticed wildcat in western Florida was supposed to have cored saturation in the Eocene Wilcox sand at 2,340-70 ft.

A flurry of checking up soon disclosed that the Florida test was worth keeping an eye on, whether the report of saturation was confirmed or not. The test, variously reported as R. D. Logan, Trustee, or Rogers Lacy et al, 1 Walton Land & Timber Co., is located in SW SW 14-1n-18w, Walton County. Walton County is the third county east of the western tip of Florida, and the well is about halfway between Mobile, Ala., and Tallahassee, Fla., about 10 miles southeast of the town of Defuniak Springs, Fla.

Two previous tests nearby were the Oil City Corp. 1 Walton Land & Timber Co., in 12-1n-19w, and the Chipley Oil Co. 1 Dekle in 27-4n-13w. On the basis of the logs of these wells, and other Florida tests, the current wildcat certainly has a chance of finding a sand section in the Eocene Wilcox, as it is located some 150 miles west of the facies change boundary, where the Lower Eocene changes from limestone (the Oldsmar lime) on the east side, to a clastic facies on the west.

Microfossils found in earlier tests establish a reasonably good correlation with the Eocene Wilcox of the Gulf Coast farther west, where it has been a substantial oil-producing formation. Whether the present location is far enough west of the facies change boundary to have good thick sand sections is a question about which flat statements are hardly in order, because so few wells have been drilled in such a large amount of territory.

The early reports gave no top for the Wilcox, but reported saturation was found in a sand cored at 2,340-70 ft., labeled Wilcox, with derrick-floor elevation at 193 ft. Assuming the reports of the sand being Wilcox are confirmed, this would put this part of the Wilcox at least 150 ft. lower than the base of the Wilcox in the Oil City Corp. well in 12-1n-19w, and substantially more than that amount lower than in the Chipley well in 27-4n-13w.

Even if the identification as Wilcox is not positive, this variation is not particularly out of line with the tentative picture of the regional geology in this area. This picture, necessarily based on meager evidence, is one of a south-plunging regional arch, and there might well be enough regional dip to account for the lower depth of the Wilcox.

## TEXAS GULF COAST

### New Pay Discovery Extends Sugar Valley Field

HOUSTON.—The Sugar Valley field has been extended to the east by Skelly Oil Co. 1 C. C. Talcott, in P. Burnett and A. S. Sojourner Survey. On potential the well flowed 128 bbl. of 32°-gravity pipe-line oil daily through a 5/32-in. choke with 410 lb. flowing pressure on the tubing, and casing sealed off. Production is from a new sand at 8,855-63 ft. Total depth is 8,508 ft., and 5½-in. casing was cemented at 9,168 ft.

Christian-Matthews 2 Lillian Scanlan, on the east side of production at North Thompson field, Fort Bend County, has been completed for a gage of 218 bbl. of 36°-gravity pipe-line oil daily through a ⅛-in. choke with 1,050 lb. flowing pressure on the tubing and 1,500 lb. pressure on the casing. Gas-oil ratio 490 to 1. Total depth is 7,956 ft. and 5½-in. casing is cemented at 7,943 ft. with 24 perforations at 7,923-33 ft. for completion. Sands showing oil were topped at 7,909 ft.

Gulf Oil Corp. 2 C. S. Settegast et al, deep test on the west flank of the Pierce Junction dome, Harris County, is testing in the 8,300-ft. level. On a test made through perforations at 8,356-72 ft. it showed a good gas blow for 5 minutes, then the bottom choke plugged up. Tool was pulled and choke was cleaned out for further testing. Total depth is in salt at 10,408 ft., and the 5½-in. casing was cemented to 10,116 ft.

In the Blessing area of Matagorda County, two new wildcats are drilling. Ralph A. Johnston 1 Live Oak Farms (Mrs. Grace P. Heffelfinger) 2 miles northeast of Blessing townsite, in Josiah Tilley League, is scheduled to be drilled to 9,500 ft. or deeper. The other test is Magnolia Petroleum Co. 1 Live Oak Farms, in the J. E. W. Wallace Survey, Abstract 99, northeast of Blessing, is drilling below 10,486 ft. This is a 10,500-ft. project. The 9⅝-in. protection casing has been cemented to 9,188 ft.

Pan American Production Co. 1 Callihan Unit, wildcat test in the Liverpool area of Brazoria County, reports some shows near the bottom. Total depth is 11,618 ft., with 7-in. pipe cemented at 11,615 ft.

The eight new locations for this week included three wildcats, one each in Chambers, Montgomery, and Wharton counties. Fort Bend County received the greatest activity reporting, four completions; Harris and Matagorda counties each received two. One new oil pay was opened in Sugar Valley field, Matagorda County, while three wildcats were dry, two in Fort Bend and one in Jackson County.

**UPPER GULF COAST SUCCESSFUL WILDCATS**

Matagorda County: New oil sand in Sugar Valley field—Skelly Oil Co. 1 C. C. Talcott, Burnett & Sojourner Survey, TD 9,508 ft., top sand 8,853 ft., perf. 23 holes 8,855-63 ft., PT 128 bbl. oil per day through a 5/32-in. choke, gas-oil ratio 847 to 1, TP 410 lb., gravity 32°, no water.

**UPPER GULF COAST WILDCAT**

Fort Bend County: W. L. Goldston 1 C. G. Roesler, F. Forester Survey, 1¾ mi. SE of Needville, dry, TD 7,100 ft.

Jack W. Frazier 1 Selma Jaeggli, Barnabus Wickson Sur., off southwest flank of Big Creek Dome, dry, TD 7,247 ft.

Jackson County: H. H. McFarland 1 W. F. Paul et al, H. Hunt Survey, 5½ mi. NE of Edna, dry, TD 3,528 ft.

## SOUTHWEST TEXAS

### First Wilcox Production Opened in Oakville Field

CORPUS CHRISTI.—The first Wilcox zone oil production for Oakville - Wilcox field, in Live Oak County, has been opened by Stanolind Oil & Gas Co. 1 L. A. Reagan, southwest outpost well in Jas. McGloin Survey. On a 40-minute drill-stem test at 6,733-36 ft. in the Slick sand, through ⅜-in. choke, recovered 1,430 ft. of 36°-gravity oil.

First oil production at Muil field, Atascosa County, has been opened by Quintana Petroleum Corp. 2 C. Muil, 9 miles north of Campbellton, and in J. C. Mattison Survey 467, 1,320 ft. southwest of the 1 Muil discovery gas-condensate will. Drilled to a total depth of 9,060 ft. the well gaged 64 bbl. of 42°-gravity oil, no water, per day through a ¼-in. choke, with gas-oil ratio 15,000 to 1. Tubing pressure is 1,000 lb., casing 1,500 lb. and the well is flowing through 100 perforations at 8,996-9,005 ft. in the Edwards lime zone.

Baldridge & King 4 W. L. Goldston, outpost about 4,640 ft. west of the gas-condensate production at Los Indios field in Hidalgo County, is testing for possible oil production discovery for the area. It tested salt water with slight show of oil through perforations at 6,928-34 ft., squeezed off these perforations and recovered 800 ft. of oil on drill-stem test through new perforations at 6,940-65 ft. Operators squeezed off these perforations and will retest.

Dulaney Oil Co. 3 State of Texas, wildcat test approximately 1 mile southwest of

Aviators field in Webb County, logged broken sand with oil show at 1,501-56 ft. The 5½-in. casing was set at 1,501 ft. Total depth is 1,560 ft. Operators will run production test.

There were 26 new locations reported this week, 3 being wildcats, 1 each in Atascosa, Duval, and Milam counties. Brooks and Duval counties shared the lead, receiving four new locations each. Three of the nine exploratory completions were successful, one oil pool in Atascosa, one oil pool in Dimmitt County, and a gas-condensate pay in Bee County. Six dry wildcats were completed, one each in Bastrop, Caldwell, Frio, Jim Hogg, San Patricio and Webb counties.

**SOUTHWEST TEXAS SUCCESSFUL WILDCATS**

Atascosa County: New oil pool—Quintana Pet. Corp. 2 C. Muil, J. C. Mattison Sur. 467, 4 mi. NE of McCoy and 9 mi. N of Campbellton, 1,320 ft. SW of 1 C. Muil discovery gas-condensate well, top pay 8,970 ft., TD 9,060 ft., perf. 100 holes 8,996-9,005 ft., PT 64 bbl. oil per day through ¼-in. choke, gas-oil ratio 15,000 to 1, TP 1,000 lb., CP 1,400 lb., gravity 42°, no water.

Bee County: New gas-condensate pay in Sliva pool—Bridwell Oil Co. 1 Jake Huble Est., Brooks & Burleson Sur., top pay, gas sand 3,422-42 ft., Frio, TD 4,500 ft., perf. 24 holes 3,422-28 ft., PT 400,000 cu. ft. gas per day and 8 bbl. per day condensate through 5/32-in. choke, TP 1,250 lb., CP 1,350 lb., shut-in pressure 1,400 lb., no water.

Dimmit County: New oil pool—Humble 1 Mrs. Kate Bradshaw, Carrizo Park pool, T&NO Sur. 15, top pay 2,795 ft., TD 2,965 ft., perf. 72 holes 2,795-2,807 ft., PT 30 bbl. oil per day on pump, gravity 37°, 3 per cent water.

**SOUTHWEST TEXAS WILDCAT FAILURES**

Bastrop County: Dunham & Gratehouse 1 McNiel Chapman, Ignatio Sartuche Sur., 2½ mi. SE of Bastrop, dry in Wilcox, TD 3,048 ft.

Caldwell County: Ellmag Oil Corp. 1 T. C. Watts, E. Curtis Sur., 5 mi. NE of Luling, dry in Buda lime, TD 2,428 ft.

Frio County: Geo. W. Strake and Warren Pet. Co. 1 Grace Cowden Henry, Pena Sur. 153, Abst. 539, 3 mi. NE of Friotown, dry, TD 3,669 ft.

Jim Hogg County: Buffalo Oil Co. 1 Ysidro Vela, El Peyote Grant, 28 mi. SE of Mirando City, dry, TD 1,915 ft.

San Patricio County: Herbert J. Schmitz and Skinner & Eddy 1 Dr. L. Cockerham, Sec. 18, Geo. H. Paul Subd. of Welder Ranch, 8 mi. NW of Sinton, dry, TD 6,303 ft.

Webb County: Slick Oil and Houser & Campbell 1 L. Moglia, Survey 722, 10½ mi. N of Bruni, dry, TD 2,711 ft.


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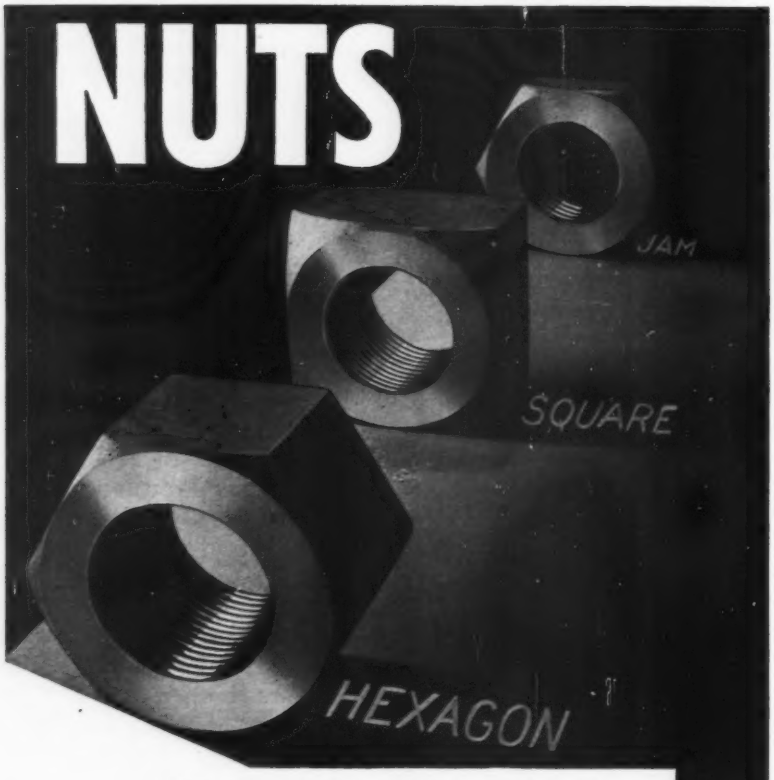


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## N. CENTRAL TEXAS

### New Canyon Lime Pool Opened South of Vernon

WICHITA FALLS. — National Associated Petroleum Co. 1 Schmoker, Section 111, Block 14, H&TC Survey, has been completed to open a new Canyon lime pool for southern Wilbarger County, 6 miles south of Vernon. On official 24-hour test it flowed 323 bbl. of 36.5° oil. It was drilled to 5,728 ft. in the Ellenburger which was dry, then plugged back to 3,510 ft. in the Canyon lime, topped at 3,500 ft., for completion. S. D. Johnson 1 Porter-Ayers, Section 58, Block 15, H&TC Survey, northwest Wilbarger County wildcat 4 miles northeast of Fargo, was drilling below 3,676 ft. in shale with no shows reported.

Cities Service Oil Co. 1 Mulkey, Section 163, Block 44, H&TC Survey, Knox County wildcat 2 miles south of Truscott, had pumped 56 bbl. of oil in 23 hours on latest test, when the pump broke down. Casing is perforated with 104 shots from 6,224-47 ft. Continental Oil Co. 1 W. H. Heath, C. A. Beatty Survey, Abstract 1358, wildcat southwest of the Risch pool of southeastern Jack County, on a test of the section from 4,430-45 ft. gaged 1,070,000 cu. ft. of gas daily on open flow. There was only a slight show of oil on a test for oil in this zone. Total depth is 6,214 ft.

Bennett & Sorrels 1 C. W. Wilton et al, Section 13, Titus County School Land Survey, wildcat 6 miles east of Sunset, Montague County, topped the Viola lime at 7,391 ft. and logged a showing of oil from 7,391-98 ft. Core was cut from 7,398-7,409 ft. Recovery was 1 ft. of lime with a slight show of oil. It was drilling below 7,409 ft. in lime.

Electra field, Wichita County, had 16 completions this week, National field, Wilbarger County, 6, and Gatewood field, Cooke County, 3. Oldham field, Archer County, had nine locations, Gatewood field four and Electra field three. National field has 11 drilling wells; Wilson field, Cooke County, nine; Cooper field, Archer County, and Sivell's Bend field, Cooke County, each six and Hildreth field, Montague County, and Knox field, Young County, each four.

In West Central Texas Lewis Steffins field, Jones County, and Stephens County Regular field each had two completions. Lewis Steffins field had two locations. Silver Valley field, Coleman County, has three drilling wells; Cisco field, Eastland County; Loving field, Stephens County; Reddin field, Taylor County, and Palo Pinto County Regular field each has two.

**NORTH CENTRAL TEXAS SUCCESSFUL WILDCAT**

Archer County: New oil pool—Grace and Grace 1 Edwards, Blk. 16, G. C. Bruner

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**NORTH CENTRAL TEXAS WILDCAT FAILURES**

Archer County: G. E. Kadane 1-B Wilson, Lot 9, Blk. 31, ATNCL, 5 mi. S and 2 mi. E Holliday, dry, TD 4,420 ft.

Cooke County: H. B. Kahn 1 Franklin Hrs., A. Rodriquez Sur. A-851, 2½ mi. W and 1 mi. N Bulcher, dry in Strawn, TD 3,688 ft.

Redman 1 J. V. Wheeler Est., H. Ledbetter Sur. A-601, 3½ mi. W and 2½ mi. S Bulcher, dry in Strawn, TD 3,010 ft.

Wichita County: J. E. Gray and W. F. Palmer 1 Burnette-Tide Water, Sec. 1, H&GN Sur. A-165, 1½ mi. S Burk Station, dry, TD 1,490 ft.

Young County: Panhandle 2 H. O. Moore et al, G. A. Ribble Sur. A-2247, 4 mi. E and 3½ mi. N Bunger, dry, TD 2,777 ft.

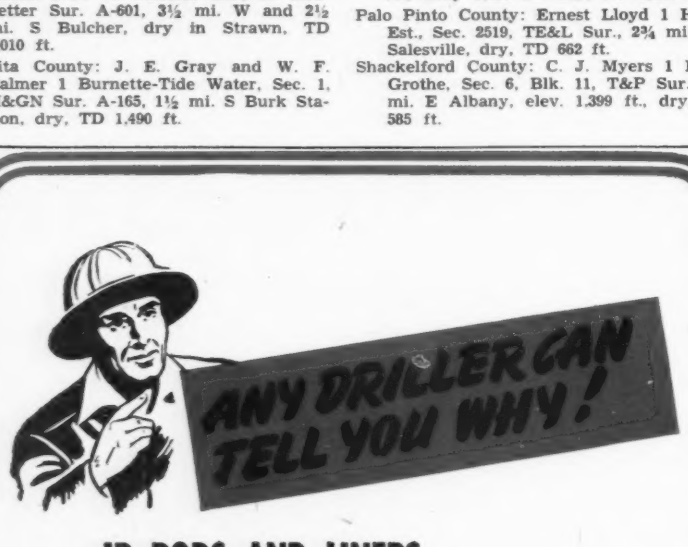
**WEST CENTRAL TEXAS WILDCAT FAILURES**

Callahan County: W. T. Gayler and J. C. Leitz 1 A. Newman, Sec. 128, BBB&C Sur., 7 mi. SE Baird, elev. 1,837 ft., dry in Sedwick, TD 820 ft.

Coleman County: H. T. Owens and P. H. Ryan 1 Creswell, Sec. 96, Blk. 2, GH&H Sur. 6½ mi. N Silver Valley, elev. 1,860 ft., Gray 3,457 ft., dry, TD 3,528 ft.

Palo Pinto County: Ernest Lloyd 1 Hayes Est., Sec. 2519, TE&L Sur., 2¾ mi. SW Salesville, dry, TD 662 ft.

Shackelford County: C. J. Myers 1 E. E. Grothe, Sec. 6, Blk. 11, T&P Sur., 1½ mi. E Albany, elev. 1,399 ft., dry, TD 585 ft.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# PERMIAN BASIN

## Several Wildcats At Testing Stage

MIDLAND.—Humble Oil & Refining Co. Lula C. Harris et al, Section 114, Block 6, H&TC Survey, Sterling County wildcat 12 miles southwest of Water Valley, took a 1-hour drill-stem test in the Ellenburger from 7,955-8,015 ft. Recovery was 200 ft. of gas-cut mud, but there was no oil nor water. It was coring and testing at 8,043 ft. in lime. Argo Oil Corp. 1 Dora Roberts, Section 294, Block 13, H&GN Survey, wildcat 13 miles northeast of Balmorhea, Reeves County, attempted a drill-stem test from 11,460-527 ft., using a 3,000-ft. water blanket. The drill pipe leaked above the water blanket and the packer failed after 75 minutes. There was a trace of oil in the bottom of the water blanket. Operator will deepen.

Placid Oil Co. and Gulf Oil Corp. 1 M. A. Thornberry, Section 5, Block A-42, Public School Lands, wildcat 1½ miles north of the west end of the Ruhman-Mascho pool, Andrews County, found some porosity and oil staining in samples from 11,880-885 ft., possibly in the Waddell section of the Simpson. Operators were coring below 11,890 ft. in sand. The Texas Co. 1-P State, Section 15, Block 12, University Land, lower Permian prospect in southwestern Andrews County, ran a 2-hour drill-stem test from 7,625-7,717 ft. Recovery was 163 ft. of oil and gas-cut drilling mud. There was a continuous blow of air throughout the test. It was being drilled deeper. The Texas Co. has made location for two more tests in the area. South of 1-P State it will drill 1-Q State, C NW SW Section 15, Block 12, and southeast of the discovery 1-R State will be drilled, C SW SE Section 15, Block 12.

Cooper Gas Co. 1-A Jess Koy, Section 38, Block L, GH&SA Survey, which opened the first major oil producing area for Schleicher County on the north flank of the Page gas field, gaged 24,700,000 cu. ft. daily on official test of the upper Strawn zone. Gas came through perforations in 5½-in. casing between 5,350-5,410 ft. following treatment of the section with 3,000 gal. of acid. The well had previously flowed 110 bbl. of high-gravity oil in 2 hours through perforations from 5,520-70 ft. on official test. The operator will apply for dual completion of the well. The company will drill an offset 1,320 ft. west of the discovery.

Stanolind Oil & Gas Co. 1 Eva B. Kayser, Section 34, Block 43, T-2-S, T&P Survey, 1¼ miles west of the South Cowden area, Ector County, was drilling below 12,119 ft. in lime. Cities Service Oil Co. 1 Parker, Section 20, Block 44, T-2-S, T&P Survey, ½ mile west of the Harper pool, another Ector County deep wildcat, was drilling below 12,057 ft. in lime.

Fullerton field, Andrews County, McCamey field, Upton County, and Keystone-Holt field, Winkler County, each had two completions this week. Slaughter field, Hockley and Cochran counties, had 10 locations, Fullerton field five, Waddell field, Crane County, four and Howard-Glasscock field, Howard County, three. TXL field, Ector County, has 36 drilling wells; Keystone-Ellenburger, Winkler County, 27; Fullerton field 25; Welch field, Dawson County, 15; Block 31 field, Crane County, 12; Keystone-Holt 9 and Martin field, Andrews County, 6.

**WEST TEXAS SUCCESSFUL WILDCAT**

Andrews County: New oil pool—Shell 1 A. Nelson, Sec. 8, Blk. A-40, PSL, 25 mi. W Andrews, flowed 479 bbl. day through 20/64-in. open hole 10,384-606 ft. Ellenburger, gravity 43°, gas-oil ratio 373 to 1, TD 10,606 ft.

**WEST TEXAS WILDCAT FAILURES**

Hockley County: Stanolind 1 Geo. L. White, Lab. 3, Leag. 704, CSL, 3 mi. SE Pep, elev. 3,546 ft., dry, TD 4,566 ft.

Runnels County: S. H. Davis et al 1-B Harris, Subd. 2, J. V. Cabrera Sur. No. 514, 1 mi. W Crews, dry, TD 4,092 ft.

**SOUTHEASTERN NEW MEXICO**

HOBBS.—The Texas Co. was preparing to abandon its 4 Blineberry, 20-22s-38e, east of lower Permian production in the Drinkard field of eastern Lea County. Electrical survey was run with the hole bottomed at 8,377 ft. in granite. A core at 8,347-53 ft. recovered 5 ft. of granite. Humble Oil & Refining Co. 1-B Federal-Leonard, 12-26s-37e, Ellenburger test ¼ mile north of the discovery of the Dublin pool of eastern Lea, was drilling below 12,235 ft. in lime and chert. Humble completed two producers in the Eunice area, one from the Drinkard pay, the other from the Paddock. Its 2-B Hardison, 34-21s-37e, on the north side of the Drinkard area, registered a daily flow of 624 bbl. of 39.8° gravity through perforations from 6,465-6,575 ft. Humble 6-S State, 2-22s-37e, rated 524 bbl. of 37° gravity oil in 24 hours from the Paddock pay. Total depth is 5,210 ft. DeKalb Agricultural Association, Inc., 1 Nellie T. Lewis, 13-10s-25e, a 6,500-ft. wildcat in south central Chaves County, was drilling below 4,312 ft. in lime.

Square Lake field, Eddy County, and Drinkard field, Lea County, each had two completions this week. Drinkard field had two locations. Caprock field, Chaves and Lea counties, has 27 drilling wells; Drinkard field 16; Grayburg-Jackson field, Eddy County, 12; Square Lake field 11; and Paddock field, Lea County, seven.

## APPALACHIAN FIELD

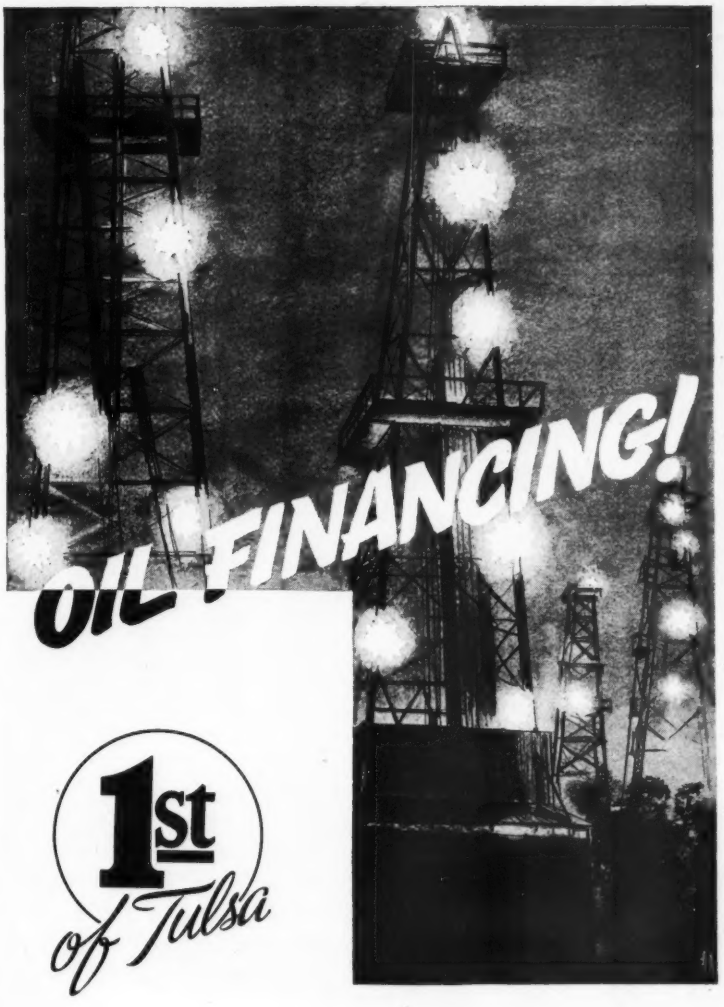
### Two Wildcats to Be Drilled Near Bergton, Virginia

PITTSBURGH.—About 40 miles north, slightly west, by road from Harrisonburg, and near Bergton, Rockingham County, Virginia, a syndicate headed by W. B. Robb has contracted for two tests to 3,200 ft. to the Oriskany sand. Several years ago, a cable-tool test was drilled on the Souder farm which topped the Oriskany sand at 2,997 ft. with an actual gage of over 60,000 cu. ft. gas, presumably just inches in the sand. It was shut in as the hole and casing were in no condition to drill deeper. The first of the new tests is being drilled with rotary and is located about 0.6 mile southwest of the Souder farm and on the Casper Dove tract. A 7⅞-in. hole is being carried and gas from the Souder well is being used in the two 250-hp. engines of the rotary.

In Ravenswood district, Jackson County, West Virginia, McIntosh & Grim completed a test on the B. F. Rader farm which after shot gaged 2,081,000 cu. ft. The Corniferous lim was topped at 4,880 ft., Oriskany 4,988-5,011 ft., gas 4,990 ft., gas 5,001-05 ft., gas 5,007-11 ft., shot 4,984-5,011 ft., and total depth 5,014 ft.

In North Strabane Township, Washington County, southwest Pennsylvania, Williams & Foley completed a 400,000 cu. ft. gas well in a test on R. B. Rush farm southeast of the new oil pool. The Gantz sand was at 2,244-87 ft., gas 2,249 ft., Fifty Foot sand 2,294-2,346 ft., gas 2,298 ft., and total depth 2,358 ft.

New locations in southwest Pennsylvania totaled six and were located in Wayne Township, Armstrong County; Porter Township, Clarion County; West Bethlehem and South Franklin townships, Washington County, and Bell Township, Westmoreland County.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## MICHIGAN

### Drilling Activity at Steady High Rate

SAGINAW.—Nineteen new locations were announced in 14 counties and 20 completions recorded in 12 counties in Michigan oil and gas fields in the past week. Completions included seven wildcat failures, six other dry holes and seven oil producers, ranging from the two of gusher proportions in the Arenac Deep River pool to a three-bbl. completion in Kent County.

Two more efforts to revive production in Saginaw County were on the wildcat failures list. The Arenac producers came in for 80 and 120 bbl. an hour. Two of the dry holes also were Deep River completions. Initial productions of from 3 to 144 bbl. a day were recorded in the other producers, in Kent, Bay, Muskegon, Barry and Allegan counties.

Three of the new locations are in Arenac County, two each in Isabella, Van Buren and Allegan, one each in Bay, Gratiot, Clare, Ottawa, Osceola, Mecosta, Missaukee, Roscommon, Montcalm and Ogemaw.

**MICHIGAN WILDCAT FAILURES**

Allegan County, Heath Township: Leonard C. Sleep 1 Arndt Estate, SW SW NW 11-3n-14w, dry in Traverse, TD 1,630 ft.

Clare County, Hayes Township: Gordon Oil Co. 1 Case, NW NW SW 5-19n-4w, dry in Marshall, TD 1,965 ft.

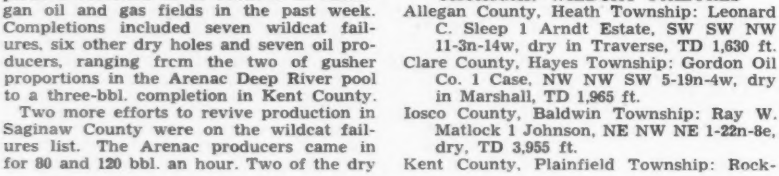
Iosco County, Baldwin Township: Ray W. Matlock 1 Johnson, NE NW NE 1-22n-8e, dry, TD 3,955 ft.

Kent County, Plainfield Township: Rockford Paper Mills, Inc., 2 Fee, NE SW SE 2-8n-11w, dry in Monroe, TD 2,673 ft.

Ogemaw County, Churchill Township: Sun Oil Co. 1 Cass et al (unitized), C-NE 12-22n-3e, dry in Antrim, TD 1,576 ft.

Saginaw County, Kochville Township: Bridgeport Oil Co. 1 Allington, NE SW NW 33-13n-4e, dry in Dundee, TD 3,285 ft.

St. Charles Township: Bridgeport Oil Co. 1 Van Sickle, SE SE SW 33-10n-3e, dry in Dundee, TD 2,932 ft.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(Fig. D373)

SPANG HOLLOW REAMER
(Fig. D375)

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For opening the hole around the top of tools or tubing, Spang Hollow Reamers (Fig. D375) or the Spang Cherry Picker are extremely useful, as are also Spang Spuds and Wall Hooks.

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## CANADIAN FIELDS

### Important New Field Found In Eastern Alberta

CHATHAM.—Indications are that an important new field in eastern Alberta has been opened by Imperial-Provost 1, LSD 3, 27-37-3w4. This wildcat test, drilled near the town of Provost and south and east of the Wainwright and Kinsella fields made a drill-stem test in the Viking sand, obtaining 1,500,000 cu. ft. gas. On deepening to 2,549 ft. a show of 28-gravity oil was encountered in the lower Cretaceous, the well flowing at the rate of around 500 bbl. The hole is being reamed for 9⅝-in. casing preparatory to a thorough test. Acreage on which the discovery well was drilled was taken by Foothills Oil & Gas Co., an Imperial subsidiary in 1945, the reservation amounting to 179,360 acres in Townships 36 to 39, Ranges 1 to 3w4. Imperial Oil, however, holds practically all the acreage from the Saskatchewan boundary along six townships west to Hardisty, and thence northwest to the Viking-Kinsella field. Earlier reports indicate 28°-gravity crude, considerably lighter than the 18°-gravity product of the Wainwright field.

**Kinsella.**—In the Kinsella field, Imperial 14, LSD 7, 28-45-9w4, bottoming at 2,048 ft., showed oil and water in the upper part of the Viking sand and in the lower part encountered oil which rose 400 ft. in the hole. After setting casing at 2,048 ft. the Viking sand was perforated, the first test showing oil and water. The well has been recemented and lower perforations are being made to test the oil horizon. A noteworthy feature is that the oil encountered is 30° gravity, much lighter than the occasional small shows of heavy crude previously encountered in the Kinsella gas wells.

**Jumping Pound.**—On the Jumping Pound structure in the foothills west of Calgary, Shell Exploration 16-14-J, LSD 16, 14-25-5w5, has drilled lower Blairmore formation from 9,310 to below 9,947 ft. Located immediately southwest of Shell 4-24-J, discovery well which finished in Madison limestone at 9,947 ft. with a large gas flow and light crude recovery running about 10 bbl., the well now drilling is testing a possible extension of the producing area.

**De Winton.**—In the DeWinton area, east of the Turner Valley north extension, Royalite 1, LSD 14, 16-21-1w5, bottoming at 8,373 ft. after encountering Madison limestone, has conducted extensive bailing tests of light crude showings encountered in and above the limestone. Indications are unfavorable for commercial production, and analysis is being made of the fluid before undertaking further work.

**Ontario.**—In Moore Township, Lambton County, Ontario, Imperial Oil, drilling on the Gordon White farm, Concession 8, and Kimball Side Road, has encountered oil apparently commercial, at 586 ft. The well is being acidized.

**Gaspe.**—In the Gaspe Peninsula, Quebec Province, Gaspe Ventures 1, spudded on May 8, has been making up to 29 ft. of hole daily. Formations encountered to 88 ft. were shales and sandstones, from which depth arenaceous shales have predominated. Owing to the isolated nature of the area

being tested, the operators have been working under serious handicaps. The ultimate producing horizon is expected at 2,355 ft., 355 ft. in the limestone. Oil encountered in previous tests was of high grade, around 47.5° gravity.

## CALIFORNIA

### Poso Creek Gets New Pay Zone

LOS ANGELES.—Bender Oil Co. has made what may prove to be an important discovery about ½ mile west of the southern tip of the Poso Creek district, Kern County, completing 2 Kelly in 20-28s-27e, pumping 132 bbl. of clean 14° oil from the Santa Margarita at 3,449-70 ft. This is about 2,500 ft. west of nearest production at Poso Creek in Section 21 where Standard has completed a number of small pumping wells.

Whereas present production at Poso Creek is coming from the Etchegoin-Chanac Pliocene contact, Bender's production is from the Santa Margarita of upper Miocene age. Poso Creek is a fault trap, with the fault extending north and northwestward, and deeper drilling nearer the fault may find Miocene production below the present pay. A number of dry wildcats have been drilled in the vicinity of Bender's new well. It is suspected that Bender's new well is located down the flank of the Poso Creek fault accumulation and that wells drilled nearer the fault will find a greater thickness of oil sand and consequently larger production.

Universal Consolidated Oil Co. is building storage to take care of future production of its 7 Sauerdough which has been finished in the upper part of the Point of Rocks formation of Eocene age in the Cymric field of Kern County. This well was shut in upon completion but should be ready for an early production test. It remains to be seen whether it will produce normal black oil or condensate. During the short test the well produced about 10,000,000 cu. ft. of gas and considerable condensate but no black oil. The Point of Rocks sand in this area may prove to be a condensate accumulation, because a previous completion also showed condensate and a large volume of gas. Universal drilled its well 7 Sauerdough to 5,498 ft. and then plugged back to 5,350 ft. and landed 80-mesh perforations from the shoe of the 8⅝-in. at 5,138 ft. to 5,350 ft.

The Cymric area, due to faulting and pinch out of sands, consists of four productive areas all relatively small but highly productive. Correlation work is possible only across small areas and even then it is difficult to determine the exact point where the unconformity occurs.

Shell Oil Co., which is drilling a wildcat for six major companies in the Rancho Sausal area between El Segundo and Playa Del Rey, is momentarily expecting to encounter the schist basement as the formation at 6,854 ft. is the overlying conglomerate. A formation test of the conglomerate at 6,830-54 ft. recovered mud with only a small amount of gas. If the schist is weathered at this point, the operators may get production similar to that developed at El Segundo and Playa Del Rey.

This is the most promising wildcat under way in the state at the present time, with better than an even chance of developing production. In certain sections of Playa Del Rey, production was restricted to the weathered schist but in other sections of the field production was secured from both the conglomerate and schist. In the present wildcat the conglomerate is apparently nonproductive but this still leaves the schist to be tested.

Several more large completions have been finished in the 237 zone at Wilmington and

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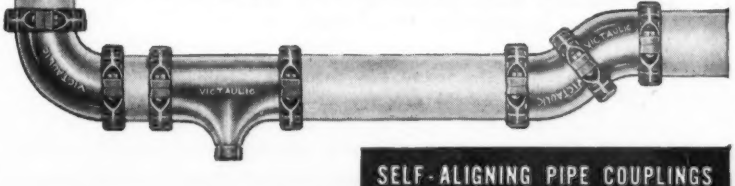


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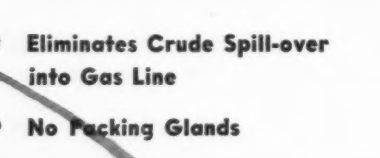

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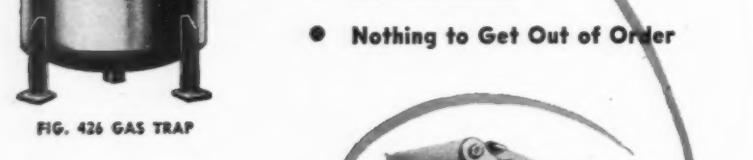



10 more are being prepared for completion. The first week in July will probably witness the completion of between five and eight new wells. Judging by the number of new locations made in recent weeks aggressive development of the 237 zone can be expected.

**CALIFORNIA WILDCAT FAILURES**

Kern County, McDonald: Richfield 1 Janes, 11-28s-19e, dry, TD 750 ft.; base Tulare 145 ft., top Santos 415 ft., Phacoides 568 ft., Point of Rocks 600 ft.

Kings County, Dudley Ridge: Western Gulf 14-8 von Glahn, 8-23s-21e, bottomed in hard gray sand, form. test 4,761-95 ft. recovered mud, no oil or gas, TD 4,841 ft.

Orange County, Kraemer: Mid-Cal Petroleum Co. 1-K, 24-3s-9w, bottomed in hard shale, no showings, TD 3,898 ft.

## SOUTH LOUISIANA

### Show of Oil Found in Avoyelles Parish Test

NEW ORLEANS. — Avoyelles Petroleum Co. 1 Bordeleon, wildcat 20 miles northeast of Eola, 56-2n-4e, in Avoyelles Parish, encountered a show of oil in top of the Wilcox zone topped at 5,542 ft. The Neale sand of the Wilcox at 7,931-49 ft. carried oil and will be treated. Show of gas and condensate was picked up at 4,480 ft. in base of the Sparta lime section and show of oil was also found in the first Sparta sand at 4,518 ft. Total depth is 9,012 ft. in Wilcox, and the 5-in. casing has been set to 7,990 ft.

Humble Oil & Refining Co. 2 Cecile W. Germany et al, recently completed in a new sand at New Iberia in Iberia Parish, 2-12s-7e, has been given a potential flow test. It gaged 297 bbl. of 33°-gravity pipeline oil through a 10/64-in. choke with 1,350 lb. pressure on the tubing. Production is through 16 perforations at 9,905-16 ft. Total depth is 10,196 ft., and 5½-in. casing set to 10,157 ft. On an initial test through 80 perforations at 10,087-10,101 ft., the well flowed at the rate of 1,600,000 cu. ft. of gas daily through a ¼-in. choke along with 30 bbl. of 44°-gravity condensate.

Sun Oil Co. and Sohio Petroleum Co. 3 E. M. Regan, new deep pay discovery well in Egan field, Acadia Parish, 31-9s-1w, has been recompleted and is showing only 5 per cent salt water as compared to 50 per cent on the initial completion. It gaged 188 bbl. of 45°-gravity condensate daily through a ¼-in. choke with 5,150 lb. tubing pressure, and gas-oil ratio of 7,824-1. Pipe was perforated with 24 shots from 11,874-80 ft. for the rtest. Original completion was made through 96 perforations at 11,874-906 ft. where it flowed 50 per cent salt water and 50 per cent 52°-gravity condensate with 6,100 lb. tubing pressure. Total depth is 13,500 ft. and 5½-in. casing is cemented to 11,986 ft.

The California Co. completed 1 E. P. Brady, Unit 1, Lease 4, at Bayou De Fleur field, west and a little north of the discovery well, 65-16s-24e. It flowed 264 bbl. of pipe-line oil, 37° gravity, daily through a 9/64-in. choke through 72 perforations at 9,358-70 ft. Total depth is 10,500 ft. and 7-in. casing is set to the bottom. Other sands showing oil and gas were 8,892-8,910 ft., 9,140-68 ft., and 9,354-80 ft. The gas-oil ratio is 500 to 1.

Only four new locations were reported this week, one a wildcat in St. Charles Parish. Five completions are oil wells and five are dry holes. Two wildcats completed were failures, one each in Point Coupee and Terrebonne parishes. Lafourche, Plaquemines, and Terrebonne parishes each received two completions.

**SOUTH LOUISIANA WILDCAT FAILURES**

Point Coupee Parish: Humble 1 W. R. Buffington, Lettsworth area, 84-1s-7e, dry, TD 11,210 ft.

Terrebonne Parish: Humble 1 Louisiana State, Lease 601, Four League Bay area, Twp. 20s-13e, dry, TD 13,680 ft.

# ROCKY MOUNTAIN

## Rangely Gets First Dry Hole in Weber

DENVER.—The first dry hole in the Rangely field in the deep Weber sand was completed when Cobb-Stringer-Newton 1-D Government, SE SE 4-1n-102w, a half mile outpost on the south side, was abandoned at 6,859 ft. Whether it establishes the limits of the field in that direction is a moot question due to stratigraphic conditions encountered. The operators, however, credit the failure to having drilled into a fault and announce their intentions of drilling another well to the south of this location.

Top of the Dakota was encountered at 3,795 ft., and the red beds at 5,515 ft. The elevation is 5,205 ft., derrick floor. The normal interval between the Dakota and the top of the Weber would have put the latter at approximately 6,275 ft. The actual top, as interpreted by some, was 6,302 ft., while the geologist who made the location placed it at 5,740 ft. It was evident, however, that faulted conditions were encountered, dips running up to 30 degrees, and the sand section not comparable with the logs of other wells. At 6,835-59 ft., cores showing some saturation were encountered, but on a drill-stem test showed water. The 7-in. was then set at 6,816 ft. to make a more satisfactory test, but this resulted in water being swabbed.

Continental Oil Co. 2 Rooth, SW SW 15-2n-103w, an outpost on the west side, which ran into a stray sand at 6,109-21 ft. showing considerable oil and heavy gas pressure, has not yet succeeded in running casing and making a test. It is reaming at 5,817 ft. to set the 9⅝-in. on top of the sand, but progress has been very slow due to the pressure and the extreme precautions necessary to keep the well from getting out of control. Special equipment is being moved in to cope with the situation.

**Pure test at Worland.**—Pure Oil Co. 1 Unit, NE NE NW 18-48n-92w, River Dome district, Washakie County, Wyoming, an inner basin test, which was drilled to 11,379 ft. in the Big Horn lime and then was plugged back to the Embar and showed for 4,000,000 cu. ft. of sour gas and an estimated 400 bbl. of 41.8° crude through perforations at 10,020-55 ft., is still testing. Completion has been delayed nearly 3 months due to everything in the hole above 6,000 ft. freezing, making it necessary to drill out the ice before tubing could be pulled. The hole has been conditioned and the well is swabbing around 60 bbl. per day, but has not yet been acidized.

**Final test on Resolute well.**—Resolute Oil Co. 8 Northern Pacific, NE SE 7-57n-101w, Badger Basin field, Park County, Wyoming, which broke loose while circulating in the first Frontier late last month and flowed 950 bbl. of high-gravity oil in 11 hours, made 1,800 bbl. in 24 hours through a ½-in. choke on final test.

**Union Oil wildcat resumes.**—Union Oil Co. of California 1 Union Pacific, SE SE SE 17-17s-48w, Eads district, eastern Colorado, which has been delayed for more than a month by a fishing job at 5,491 ft., has cleared the hole and is drilling ahead. It is estimated to be 300 ft. above the granite. Slight saturation was encountered in the Kansas City-Lansing horizon, topped at 3,880 ft., followed by sulfur water.

**Oil show in water well.**—Some excitement was occasioned the past week when Clifford Stauder, drilling a water well on state land in 16-23s-60w, Pueblo County, Colorado, reported a show of oil at 1,300 ft. to the State Land Board. The board immediately withdrew 100,000 acres of state land in the area from entry pending an investigation. Oil men visting the location reported that the top of the Dakota was encountered at 1,306 ft. and that it showed some residue oil which was heavy and of the consistency of axle grease. Interest was intensified by the fact that major companies have several hundred thousand acres under lease in Pueblo County.

**Cut Bank deeper pay.**—A third Madison well after finding oil in the top of that formation has been deepened with favorable results in Carter Oil Co. 1 Merchants Trust Co., C NW NW 7-36n-5w, an east offset to the Brindley discovery. It had the top of the Madison at 3,039 ft., and at 3,071 ft. flowed 3 bbl. of oil through a ½-in. choke with 100,000 cu. ft. of gas. It was deepened to 3,084 ft., following favorable results in Union Oil Co. 1 Stufft 2 miles to the south, and before acidizing flowed as high as 91 bbl. in 23 hours. It later flowed 83 bbl. through a ½-in. choke with tubing pressure of 650 lb. and casing pressure of 730 lb.

**Cat Creek tests.**—Exploration of the Ellis sand in Cat Creek, a deeper pay encountered last fall, resulted in several completions this week. Texas Co. 2 Northern Pacific, NW NE NW 35-15n-30e, on the East Dome, southeast of the discovery, failed to encounter any shows and was abandoned at 1,900 ft. Continental Oil Co. 11 Harlan, SW SW NW 10-15n-29e, on the West Dome, flowed 48 bbl. of fluid, of which 35 per cent was oil, in 24 hours. It is a northeast offset to 12-A Rhens, which showed some oil with water. East Flank Oil Co. 1 Northern Pacific, NW NW NW 9-14-31, had water at 1,900 ft., and was abandoned. B. R. Gainer 1 Fradd, SW SW SW 4-15n-29e, swabbed


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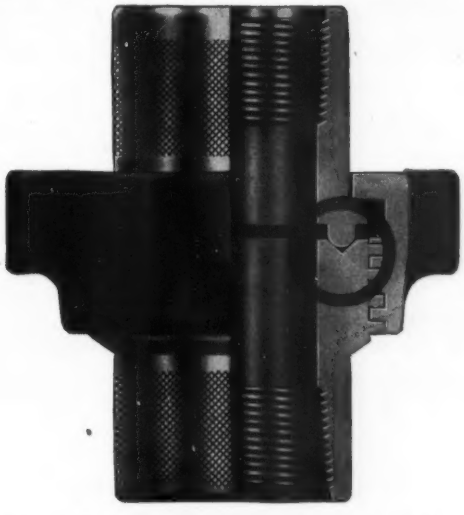

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water at 1,915 ft., and was abandoned.

**New operations.** — Fourteen new operations were reported, 4 in Colorado, 2 in Wyoming, and 8 in Montana. The Colorado locations were in the Rangely field, two each by California Co. and Stanolind Oil & Gas Co. The Wyoming locations consisted of two wildcats, both by Continental Oil Co. One is 4 Shoshone, SE SW NW 6-6n-2w, Circle Ridge field, which is the third attempt to test the Madison. Two former attempts were completed as producers in the Tensleep at shallow depths when the holes, drilled with cable tools, went crooked. The other is Continental 2 Government, SW SE SW 27-43n-91w, Lake Creek structure, Hot Springs County, which will test the Embar-Tensleep at 3,600 to 4,000 ft. This structure is close to Corley Dome and Zimmerman Butte, both recent discoveries in the Embar. Continental drilled to 3,830 ft. in 1925 and had oil in the Embar, the well having been shut in ever since. The Montana locations include two each in Cut Bank, Cat Creek and Kevin-Sunburst, and one each in Cedar Creek and Bowdoin, all development wells.

**MONTANA SUCCESSFUL WILDCATS**

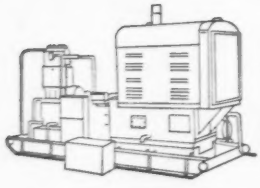
Rattlesnake Butte, Petroleum County: H. H. Swartz et al 1 Government, SW SE 22-13n-28e, TD 3,235 ft., PB to 2,810 ft., completed in second Cat Creek, top 2,780 ft., for 20 bbl. per day on pump.

Cat Creek, Petroleum County: Continental Oil Co. 11 Harlan, SW SW NW 10-15n-29e, TD 1,904 ft., flowed 48 bbl. of fluid, 35 per cent oil, in 24 hours, top of Ellis 1,874 ft.

**MONTANA WILDCAT FAILURES**

Cat Creek, Petroleum County: B. R. Gainer 1 Fradd, SW SW SW 4-15n-29e, TD 1,915 ft., plugged in Morrison.


# Story of 2 Engines



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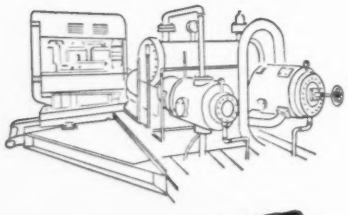

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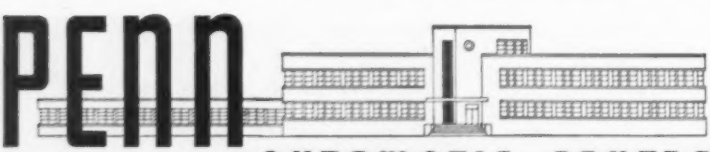

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Grandview, Toole County: Union Oil Co. 1 Danielson, NE NE NW 8-34n-2e, TD 1,95[illegible] ft., top of Madison 1,950 ft., dry.

**WYOMING WILDCAT FAILURE**

No Wood, Washakie County: Warren Skelton 1 Myra Skelton Tract 38, Section 5-48-90, TD 1,501 ft., dry and abd. in Madison.

## ILLINOIS

### Wayne County Wildcat Has Flow of Clean Oil

MATTOON.—The Deep Rock Oil Co. 1 Ulysses, NE NW NW 30-1n-6e, Wayne County, has encountered oil in the McClosky at 3,151-57 ft. A drill-stem test from 3,140-60 ft. recovered gas in 14 minutes and flowed clean oil in 1 hour. Operators have set 5½-in. casing to 3,148 ft. and are moving in cable tools to drill plug. The 1 Ulysses is about a mile east of a recently completed extension well of the West Johnsonville field and will probably result in a further extension of that field.

In Marion County, Sohio Petroleum Corp. 1 R. W. Hawkins, SE SE NW 29-1n-4e, is waiting on cement with 5½-in. casing set at 2,865 ft. Porous breaks in the McClosky were encountered at 2,877-79 ft., 2,881-83 ft., 2,884-86 ft., and 2,906-10 ft., total depth 2,930 ft. A 1-hour drill-stem test recovered 150 ft. of clean oil. This wildcat is about 2 miles east of the Exchange pool.

The Paul Doran et al 1 T. S. Root, Bond County wildcat in SE SE NE 16-6n-4w, has been attracting some attention during the past week. At present it is waiting on cement with 5½-in. casing set on the Trenton lime at 2,700-35, total depth. No drill-stem test has been run on this well but it is believed to have encountered some saturation.

Exploratory drilling in the Illinois Basin appears to have established a definite upward trend with 11 new wildcat tests started during the past week, 1 each in Coles, Christian, Union, Alexander, Shelby, Crawford, Clinton, Edwards, and 2 in Marion County. From these locations it appears that operators are shooting for shallow production around the rim of the basin in an attempt to extend the productive area of the state. Other new operations for the week included 40 development wells.

Completions for the week remained at a relatively high level with a total of 54 wells reported. These included 26 dry holes and 28 oil wells. Twelve wildcat completions were reported, all of which were dry.

**ILLINOIS WILDCAT FAILURES**

Clinton County: H. A. Harmon 1 Schlafly, SE SE SW 25-2n-3w, dry at 2,640 ft., Glen Dean 883 ft., Cypress sand 1,089 ft., Benoist 1,185 ft., Ste. Genevieve 1,379 ft., Louisiana 2,507 ft., Devonian 2,568 ft.

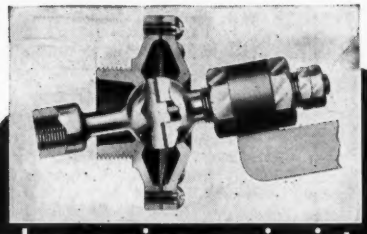
Coles County: O. O. Borden 1 W. J. Temple, NW NW NE 31-14n-11e, dry at 1,205 ft., Devonian 963 ft., Silurian 1,113 ft., Chattanooga 870 ft., Devonian 971 ft.

National Oil Co. 1 Wilson, SE NE SW 4-13n-14w, dry at 1,181 ft., Chattanooga 1,094 ft., Devonian 1,167 ft.

Cumberland County: W. H. Richardson 1 W. Barnett, NE NW SE 25-9n-10e, dry at 1,597 ft., Barlow lime 1,202 ft., Cypress sand 1,253 ft., Ste. Genevieve 1,474 ft.

Edwards County: W. C. McBride 1 Proctor, SW NE NW 17-3s-14w, dry at 3,170 ft., Menard 2,332 ft., Tar Springs sand 2,434 ft., Glen Dean 2,528 ft., Hardinsburg 2,584 ft., Cypress sand 2,777 ft., Benoist 2,919 ft., Renault 2,960 ft., Aux Vases sand 3,017 ft., Ste. Genevieve 3,051 ft., McCloskey 3,078 ft.

Central Pipe Line 1 C. Bump, NE NE SW 9-3s-14w, dry at 3,106 ft., Palestine 2,120 ft., Tar Springs 2,322 ft., Glen



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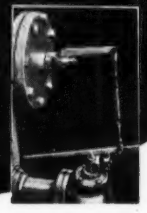

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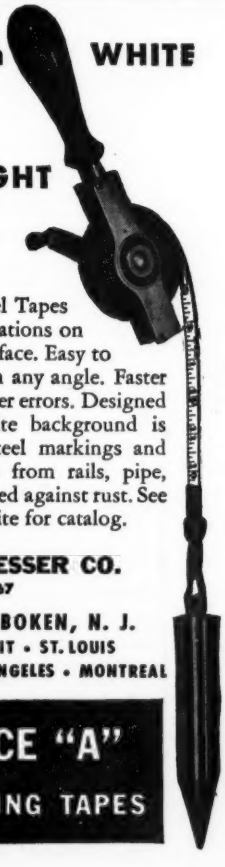

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Dean 2,462 ft., Hardinsburg 2,518 ft., Cypress sand 2,759 ft., Benoist 2,839 ft., Renault 2,896 ft., Aux Vases sand 2,939 ft., Ste. Genevieve 2,988 ft., Fredonia 3,042 ft., McClosky 3,047 ft.

Hamilton County: Tex Harvey 1 Wilson, NE SE SW 23-5s-7e, dry at 3,562 ft., Ste. Genevieve 3,380 ft., Fredonia 3,441 ft., McClosky 3,455 ft.

Macoupin County: J. Z. Gill 1 Taylor, NW NE SE 31-9n-8w, dry at 858 ft., Pennsylvania sand 410 ft.

Marion County: C. R. Winn 1 J. Dedmond, NW NE SE 22-2n-1e, dry at 1,980 ft., Glen Dean 1,538 ft., Cypress sand 1,756 ft., Benoist 1,879 ft., Renault 1,920 ft., Aux Vases sand 1,924 ft., Ste. Genevieve 1,966 ft.

Shelby County: A. J. Hammer 1 Smith, NE SE NE 18-9n-4e, dry at 1,514 ft., Tar Springs 1,408 ft., Glen Dean 1,510 ft.

National Consumers 1 H. Stewardson, SW SW NE 16-11n-4e, dry at 2,050 ft., Rosiclare 1,972 ft., Fredonia 2,013 ft., McClosky 2,043 ft.

Washington County: Friper & Simpson 1 J. Pieszchalske, NW SE NE 29-3s-1w, dry at 1,505 ft., Glen Dean 1,024 ft., Golconda 1,094 ft., Cypress sand 1,228 ft., Benoist 1,356 ft., Renault 1,448 ft., Aux Vases sand 1,475 ft.

## MISSISSIPPI

### Saturated Wilcox Sand Reported in Florida Test

JACKSON.—According to reports current here, Rogers Lacy, independent operator of Longview, Tex., had cored saturated Eocene Wilcox sand at his 1 Walton Land & Lumber Co. in SW SW SW 14-1n-18w, some 10 miles southeast of Defuniak Springs, Walton County. Top of the sand had not been determined but saturation was said to be found in a core at 2,340-70 ft.

Companies reported holding acreage in the vicinity are Shell Oil Co., Inc., Stanolind Oil & Gas Co., Gulf Refining Co., The Texas Co., and the California Co.

First Comanche sand producer in Mississippi was reported last week in the Hub field, Marion County, at Humble Oil & Refining Co. 3 E. A. Ball, 20-2n-14e. Top of Comanche, below the Massive sands, was 9,384 ft. Five-inch casing was perforated at 10,098-10,106 ft. and on 18-hour test the well flowed at the rate of 43 bbl. of 53° gravity condensate per day through ⅛-in. tubing choke, with 1,490,000 cu. ft. of gas. Flowing pressure was 3,450 lb.

In Clarke County, Mississippi, Sun Oil Co. 2 Long Bell Petroleum Co., 17-2n-17e, reported a fault of approximately 300 ft. at 4,030 ft., going from lower Eutaw into Tuscaloosa. All Eutaw sands on the downthrow side of the fault, and sand breaks in the upper Tuscaloosa, (Davis, Massive and Comanche sands), have been cored with no shows. Location is said to be 2 miles southeast of the 1 Long Bell, which was dry at total depth of 5,740 ft. in Comanche sand, early this year, after failing to show faulting at any point.

**MISSISSIPPI WILDCAT FAILURES**

Copiah County: Sun Oil Co. et al 1 Mrs. Lee Little, SE SW NW 8-2n-4w, dry at 3,143 ft., top Cap Rock 2,630 ft.

Madison County: Union Producing Co. A-1 Cameron, NE NW 2-9n-1e, dry, TD 5,218 ft., 640 ft., Zilpha 1,150 ft., Winona 1,440 ft., Wilcox 1,703 ft., Midway 3,912 ft., Clayton 4,700 ft.

Wilkinson County: Danciger Oil & Refining Co. 1 G. W. Armstrong, NE NE 5-4n-2w, dry at 11,345 ft., Tuscaloosa 10,467 ft., Marine Tuscaloosa 10,670 ft., Massive sand 11,192 ft., Comanche 11,223 ft.

**FLORIDA WILDCAT FAILURES**

Liberty County: Pure Oil Co. 1 Gex-Lewin,

E½ NE NE, dry at 4,744 ft., no tops available.

Monroe County: O. D. Robinson 1 State (Blanchard Concession), N½ N½ NW 29-59s-40e, dry at 12,051 ft., lower Cretaceous 7,020 ft., shows heavy black oil at intervals between 10,162-10,365 ft.

## OHIO, KENTUCKY

### Three Gas Fields Get Extensions

COLUMBUS.—The Richfield pool in Perry Township, Stark County, was further extended ¾ mile to the west by Wm. Pfeiffer 1 Chas. Gans, Sec. 32, which had White Clinton from 4,237-65 ft., and gaged 1,052,000 cu. ft. natural. The well is to be shot.

Ohio Fuel 1 Winnett Consolidation, Sec. 2, Knox Township, Guernsey County, extended the Wheeling pool ½ mile south and west. Oriskany sand was logged at 3,207-30 ft., and the well gaged 363,000 cu. ft. natural.

The Symmes pool in Lawrence County was extended into Decatur Township by Ohio Fuel 1 D. A. Moulton, Sec. 13. The Clinton was topped at 3,131 ft. and drilled to 3,157 ft., and produced 1,600,000 cu. ft. gas.

Drilling in the Somerset area in Perry County continues at a fast pace with from two to four completions a week, divided almost equally between oil, gas, and dry. In Sec. 17, Reading Township, Wiser Oil 4 Isabel Ream found Clinton at 2,945-87 ft., and a natural production of 798,000 cu. ft. B. G. Bartley 1 Spangler, Sec. 25, Hopewell Township, was dry and plugged. In the same Township, Industrial Gas 6 R. B. Skinner is showing oil and gas, and will be shot.

The Canton area, still very active, reported seven locations for the week. Completions for the area average about three each week.

Wasson et al 3 Hattie Murphy, Section 21, Salt Creek Township, Muskingum County, was reported as making 8,924,000 cu. ft., 23 ft. in the Clinton sand.

#### WESTERN KENTUCKY

OWENSBORO.—Sun Oil Co. is drilling ahead at 2,320 ft. in the 1 Willett-Byrne, 2-O-21, Union County wildcat, after a 1-hour drill-stem test of the Cypress sand recovered only 25 ft. of mud and 25 ft. of salty mud with a slight show of oil. Streaked saturation was encountered in the Cypress at 2,257-62 ft.

Eight completions were reported in the Western Kentucky area during the past week. These included three oil wells and five dry holes, one an unsuccessful wildcat. Seven new operations were reported.

#### WESTERN KENTUCKY WILDCAT FAILURE

Crittenden County: J. L. Kennard et al 1 Rachel Etheridge, 10-J-18, elev. 550 ft., dry at 1,120 ft., Menard 60 ft., Viola 215 ft., Tar Springs 240 ft., Glen Dean 335 ft., Hardinsburg 395 ft., Cypress 720 ft., Benoist 775 ft., Renault 820 ft.

#### EASTERN KENTUCKY

ASHLAND.—No completions were reported in the eastern Kentucky field of operations over a seven-county are during the past week, but considerable work in rigging up, road building, etc., was noted.

#### INDIANA

EVANSVILLE.—Continental Oil Co. 1-D Cooper Estate, SW SW 13-3s-14w, first deep test in the Griffin field, has reached the Dutch Creek formation in the top of the Devonian. A 1-hour drill-stem test of this formation at 4,860-73½ ft. recovered 1,030

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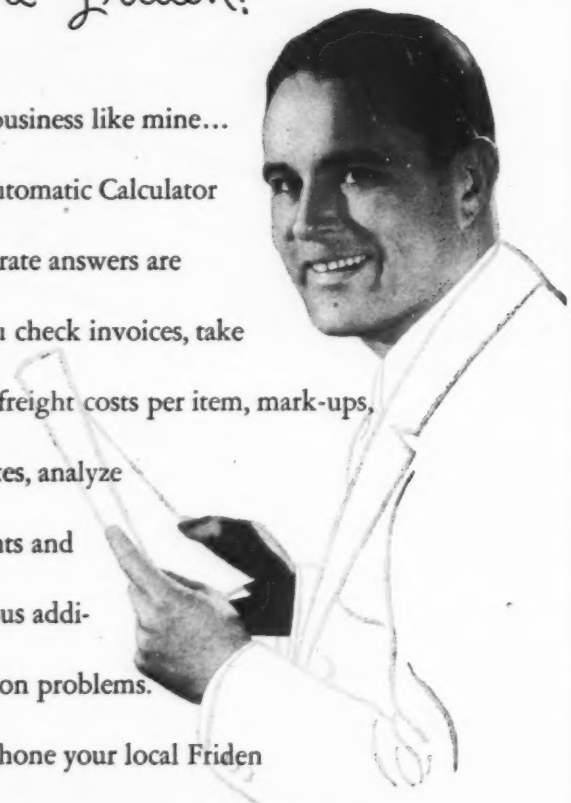

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ft. of gas with no oil or water. Drilling was then resumed and the well is now below 4,880 ft.

The Carter Oil Co. is cleaning out to test their Posey County wildcat, the 1 John Larkin, SE NE SW 17-6s-14w. Saturation was encountered in the Aux Vases sand at 2,791-2,803 ft., total depth 2,813 ft., and on a 13-hour test 2½ bbl. of oil and 3 bbl. of salt water were swabbed.

Indiana operators during the past week completed six oil wells and two dry holes. One of the dry holes was a wildcat, the first wildcat completion in several weeks. Twelve new operations were announced during the week.

**INDIANA WILDCAT FAILURE**

Posey County: Flemming & Swann 1 Hartman, NW NW SE 27-6s-12w, elev. 365 ft., dry at 2,757 ft.

## LA.-ARK.

### Drilling Activity Increasing In Louisiana and Arkansas

SHREVEPORT.—Reports from North Louisiana and South Arkansas indicate a revival of wildcat activity, together with an increase in all drilling.

In Bossier Parish, Louisiana, north of the town of Bolinger and about 4 miles southwest of the Carterville oil and gas pool, Barnsdall Oil Co.'s 1 Carter Burton, in 26-23n-13w, was drilling ahead in hard sand and shale at 10,865 ft., at last report. The well had not as yet reached Smackover lime.

In Nevada County, Arkansas, southwest of the town of Willisville and some 3 miles southwest of the Irma pool, Placid Oil Co.'s 1 West, 19-14s-21w, was drilling below 5,210 ft.

**NORTH LOUISIANA WILDCAT FAILURES**

Sabine Parish: Ben Jones 1 Phares, NW NW NW 9-5n-12w, dry, TD 2,425 ft.

McDaniel Bros. 1 4-L Co., SE SE NE 33-6n-12w, made 9 bbl. oil, Wilcox 1,398-1,401 ft., TD 2,517 ft.

## EASTERN TEXAS

### Old Smith County Test to Deepen to Travis Peak

DALLAS.—B. F. Phillips 1 Phillips-Jordan fee, Smith County wildcat failure in 1941, 4 miles west of production in the East Texas field, will be drilled deeper to the Travis Peak sand. It was carried to 5,792 ft. in the Paluxy horizon. Woodbine was topped at 3,413 ft. and Glenrose at 5,352 ft. Elevation is 383 ft. It is 3,200 ft. west of the east line and 2,900 ft. north of the south line of the Oscar Hawkins Survey, 5½ miles east of Starville. The Texas Co. 1 Shamburger, J. M. Spiller Survey, east of production in the Sand Flat field, Smith County, recovered salt water on drill-stem tests at 7,272-7,300 ft. and at 7,262-80 ft. Operator squeezed perforations from 7,262-80 ft. and is waiting on cement to set.

Magnolia Petroleum Co. has staked 1 Southern Pine, deep wildcat in the Weches sector of Houston County. It is 330 ft. from the north and west lines of 110-acre tract in the Leonard Williams Survey. Another new Houston County wildcat is Continental Oil Co. 1 Well, H. Bozeman Survey, a 12,000-ft. test 17 miles west of Crockett. It is to begin drilling in October.

Hawkins field, Wood County, had five completions this week. Carthage field, Panola County, and Hawkins field each had eight locations, and Tri-Cities field, Hen-

derson County, and Merigale field, Wood County, each had three. Carthage field has 30 drilling wells; Hawkins field 18; New Hope field, Franklin County, Sand Flat field, Smith County, and Marigale field five each and the Talco field in Franklin and titus counties, four.

**EASTERN TEXAS SUCCESSFUL WILDCAT**

Marion County: New oil pool—Magnolia 1 Orr, R. B. Fowler Sur., 3½ mi. SW Avinger, elev. 439 ft., pumped 116 bbl. day, perf. 7,568-77 ft. Travis Peak, gravity 40.9°, Cotton Valley 9,265 ft., dry, TD 10,513 ft.

# OKLAHOMA

## New Discovery in Prospect For South Walters Area

A WILDCAT 5 miles southwest of the town of Temple, R. B. Ferris 1 Wookkah-nah, SW NW SW 1-4s-11w, Cotton County, is installing pump to test a saturated sand found at 1,320-28 ft., total depth. Casing was cemented at 1,301 ft. and the wildcat showed for a producer when the plug was drilled. The well is south of a recent discovery by Bridwell et al, which has been named the Essaquanahdale pool.

In the same area, Ferris 1 Ah-too-was, SE SW NE 2-4s-11w, is drilling ahead to the Ellenburger after getting a show of oil in the shallow sand. To the southwest, Johnson-Flesher Drilling Co. 1 McCullough, NW SE NW 17-4s-13w, has been given up as a dry hole at a total depth of approximately 5,000 ft. Ellenburger was topped at 4,500 ft. and slight shows of oil were found in the lime at 4,510-40 ft. Slight saturation was also reported at 2,617-62 ft.

Cities Service Oil Co. et al have brought in their 1 Odom, NE SE 21-5n-4w, for 160 bbl. of oil in 10 hours. The 1 Odom is in the North Lindsay pool of southwestern McClain County, Oklahoma's deepest producing area. The well was opened for test with a ½-in. choke on bottom and a 5/16-in. top hole choke. It flowed 160 bbl. of oil along with 780,000 cu. ft. of gas in 10 hours before packer failed. Well head connections are now being installed for further production tests.

The Cities Service 1 Von Wedel, NE NE 21-5n-4w, flowed an estimated 9 bbl. of oil an hour on a drill-stem test from 10,972-11,027 ft., and is drilling ahead below 11,073 ft. The same operators 1-B Lawson, NE SW 22-5n-4w. is coring ahead at 11,163 ft.

Two interesting wildcat tests for the Garvin County deep play have been announced and will be drilled southwest of Wynnewood. Jordan Petroleum Co. has staked location for the 1 Carroll in SE NW 36-2n-1w, about 5 miles southwest of Wynnewood. It will be a Bromide sand test. Also to be drilled as a Bromide sand test is the Carter Oil Co. 1 Buford, NW NW 5-1n-1w, 1 mile northeast of Katie. This well is 12 miles from the nearest Bromide production and is scheduled to go to 8,000 ft. with work to start within a short time.

**OKLAHOMA SUCCESSFUL WILDCAT COMPLETIONS**

Grady County, SW of Chitwood gas pool: Magnolia Pet. Co. 1 Britt Unit, SE NW SW 3-4n-6w, flowed 268 bbl. oil in 16 hr., 65.6-gravity, from Springer sand 10,908-10,992 ft., estimated 5,000,000 cu. ft. gas, TD 11,472 ft.

Osage County, N of Gilliland pool: Texas Co. 1 C. Smith, SE SE SE 17-23n-7e, swabbed 25 bbl., oil limestone 2,996-3,034 ft., TD 3,206 ft.

Sephens County, N of Cruce: T. H. McCasland 1-A Payne, SW SE SE 19-1n-5w, flowed 268 bbl. oil in 8 hr., ¼-in. tubing choke, 32-gravity, from sand at 2,923-40 ft., TD.

**OKLAHOMA WILDCAT FAILURES**

Caddo County: Nail-Reed Oil Co. 1-A Coyle, NE NE NE 33-5n-12w, dry, TD 1,118 ft., show oil in sand at 44-72 ft., reported bailed 1 bbl. oil an hr.

Cotton County: Gus Blakely 1 Henderson, NW NW NE 34-3s-11w, dry, TD 1,562 ft., sand 1,521 ft.

Jefferson County: Woolsey & Baker 2 Brown, SE SW SE 22-6s-6w, dry, TD 2,200 ft.

Kay County: Dave Morgan et al 1 Peoples, SE NW NW 3-25n-2w, dry, TD 4,458 ft., Mississippian chat 4,378 ft.

Lincoln County: Mid-Continent Pet. 1 J. B. Florer, NE NE NE 4-15n-6e, dry, TD 4,135 ft., Wilcox 4,020 ft.

Continental Oil Co. 1 DeWitt, SE SW SE 13-13n-3e, dry, TD 5,285 ft., Hunton 5,033 ft.

Osage County: A. G. Oliphant No. 1, NE SE SW 35-25n-4e, dry, TD 3,398 ft., chert 3,348 ft.

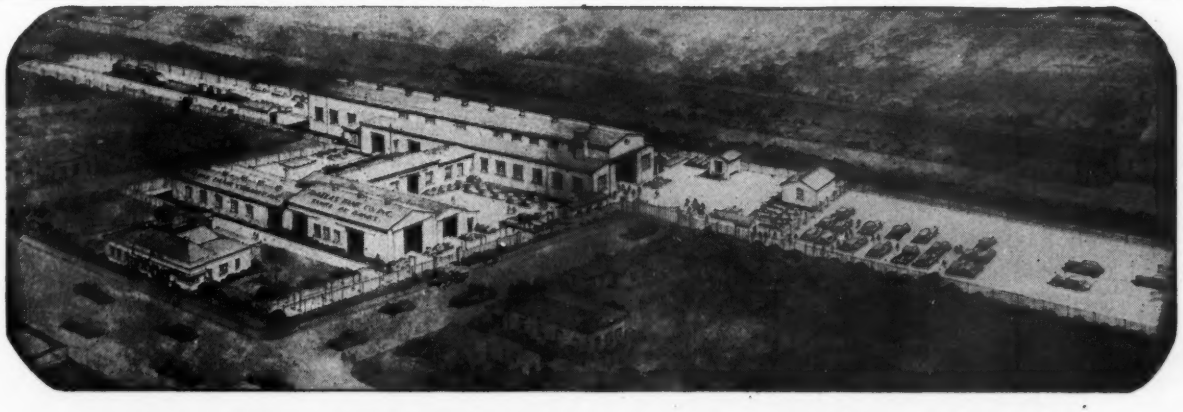
Seminole County: Wood Oil Co. 1 Whitney, SE SE NE 3-8n-6e, dry, TD 4,350 ft., Simpson dolomite 4,285 ft.

Stephens County: Stoner & Cummings 1-A Neal, SE SW SW 22-1n-4w, dry, TD 800 ft. in shale.

# KANSAS

## Barber County Discovery Deepening to Increase Flow

SKELLY OIL CO. is attempting to increase the flow of oil at its apparent pool opener in Barber County, 1-C Boggs, SW NE NE 17-33-12w, by deepening in the Simpson, topped at 4,811 ft. Total depth is 4,811 ft. with casing set at 4,802 ft. At this depth, the well flowed 1 bbl. of oil an hour during an 18-hour test and made an

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estimated 400,000 cu. ft. of gas. The 1-C Boggs is about a mile east of the Medicine Lodge field.

Also in Barber County, Continental Oil Co. has started work on a new wildcat test 4 miles southeast of the Skinner pool, in the west central part of the county. The well is the 1 Lake, SE SE SW 11-32-14w, on a large block assembled in the area by Continental.

Anderson-Pritchard have made a new gas strike in Marion County at their 1 Warkentine, SE SE NW 27-1n-9e. A drill-stem test of the Mississippi, logged at 2,806 ft., recovered a strong blow of gas and 5-in. casing was set at 2,808 ft. The well was then drilled to a total depth of 2,828 ft. where it was estimated as good for 12,000,000 to 15,000,000 cu. ft. of gas daily. This gas strike is about 7½ miles east of the Ritz-Canton field of McPherson County and about 8 miles southwest of the Hillsboro field of Marion County. It is also about 6 miles east of the J. M. Huber 1 Sinclair, SW SW SW 25-19-1w, McPherson County, a reworked dry hole which is flowing at the rate of 7 bbl. of oil an hour along with an estimated 2,000,000 cu. ft. of gas per day.

**KANSAS WILDCAT FAILURES**

Butler County: O. J. Connell et al 1 Covert, SW NW SW 3-27s-5e, dry, TD 2,777 ft., Mississippi lime 2,718 ft.

E. H. Adair 1 Johnson, SE SW NW 29-25s-4e, dry, TD 2,800 ft., Arbuckle 2,795 ft.

Dunnett Strait 1 King, SE SE NW 3-24s-4e, dry, TD 2,555 ft., Mississippi lime 2,500 ft.

Decatur County: Helmerich & Payne 1 Jorn, SE SE SW 28-2s-28w, dry, TD 4,163 ft., Regan sand 4,139 ft.

Dickinson County: Veeder Supply 1 Schwartz, dry, TD 2,724 ft., Mississippi lime 2,692 ft.

Ellis County: Doley Oil 1 Shubert, SE SE SE 32-12s-2w, dry, TD 3,826 ft., Arbuckle 3,812 ft.

Kearny County: Skelly Oil Co. 1 Leighton, NW NW SE 11-21s-37w, dry, TD 2,959 ft., Winfield 2,910 ft.

**LEGAL**

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, Washington, D. C. Notice is hereby given that sealed bids will be received until 1 p.m. Wednesday, July 17, 1946, for land described herein situated within the known geologic structure of the Holcomb area of the Hugoton gas field, 6th P. M., Kansas. This land is offered to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act as amended by the Act of August 21, 1935 (49 Stat. 674, 30 U.S.C. sec. 226), in the following parcels: Parcel No. 1, T. 26 S., R. 34 W., sec. 6, lot 3, 98.19 acres; Parcel No. 2, T. 26 S., R. 36 W., sec. 29, N½NW¼, 80 acres; Parcel No. 3, T. 26 S., R. 37 W., sec. 10, SE¼, 160 acres; Parcel No. 4, T. 24 S., R. 33 W., sec. 18, lot 4, 35.72 acres; Parcel No. 5, T. 32 S., R. 33 W., sec. 19, lot 3, 37.53 acres; Parcel No. 6, T. 32 S., R. 34 W., sec. 25, W½NE¼, E½NW¼, NW¼SE¼, 200 acres. Total 431.44 acres. Annual rental will be at the rate of 25 cents per acre so long as the land is valuable only for gas; but upon discovery of a valuable deposit of oil within the boundaries of the known structure on which all or a part of these lands are situated, rental will be not less than $1.00 per acre. Each bidder must submit with the bid one-fifth of the amount bid in cash, or by certified check made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease, required under 43 CFR 192.19. The envelopes should be plainly marked "Bid for Parcel No.——, Hugoton gas field, Kansas. Not to be opened before 1 p.m. July 17, 1946." No bids received after the hour fixed for receiving bids will be considered. The remainder of the bonus and the annual rental at the rate of 25 cents per acre must be paid and a $5,000 corporate surety bond must be furnished by a successful bidder prior to the issuance of a lease. The deposits of the other bidders will be returned upon acceptance of the successful bids by the Secretary of the Interior. The successful bidder will be required to agree not to discriminate against any employee or applicant for employment because of race, creed, color, or national origin, and to require an identical provision to be included in all subcontracts. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.

# CALENDAR OF EVENTS

**July**

Los Angeles Nomads, annual meeting and party, Mayfair Hotel. July 10.

Texas Railroad Commission, statewide proration hearing on August allowable, Austin, July 17.

Houston Nomads, Old College Inn, Houston, July 29.

**August**

Interstate Oil Compact Commission, quarterly meeting, August 8-10, Grand Rapids, Mich.

Houston Nomads, Old College Inn, Houston, August 26.

American Institute of Chemical Engineers, western convention, Palace Hotel, San Francisco, August 25-28.

**September**

Sixth annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va., September 9-11.

American Chemical Society, semiannual meeting, Chicago, September 9 to 13.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 10-12.

Fourth National Chemical Exposition, sponsored by Chicago section, American Chemical Society, Coliseum, Chicago, September 10-14.

Los Angeles Nomads, Mayfair Hotel, September 11.

National instrument conference, sponsored by Instrument Society of America, William Penn Hotel, Pittsburgh, September 16-20.

National Petroleum Association, forty-fourth annual meeting, Hotel Traymore, Atlantic City, N. J., September 18-20.

Houston Nomads, Old College Inn, Houston, September 30.

**October**

American Association of Oilwell Drilling Contractors, sixth annual meeting, Plaza Hotel, San Antonio, Tex., October 1-2.

American Institute of Mining and Metallurigal Engineers, Petroleum Division, annual meeting, Galvez Hotel, Galveston, Tex., October 3-5.

American Gas Association, annual meeting, Atlantic City, October 7-12.

Los Angeles Nomads, Mayfair Hotel, October 9.

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 16-18.

American Institute of Mining and Metallurical Engineers, Petroleum Division, annual meeting, Ambassador Hotel, Los Angeles, October 24-25.

American Association of Petroleum Geologists, midyear meeting, Buena Vista Hotel, Biloxi, Miss., October 24-25.

Houston Nomads, Old College Inn, Houston, October 28.

Independent Petroleum Association of America, annual meeting, Fort Worth, October 28-30.

**November**

Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa, November 7-8.

A.P.I. annual meeting, Stevens Hotel, Chicago, November 11-14.

Los Angeles Nomads, Mayfair Hotel, November 13.

Rocky Mountain Oil and Gas Association, annual meeting, November 21-23, Shirley-Savoy Hotel, Denver.

Houston Nomads, Old College Inn, Houston, November 25.

**December**

American Society of Mechanical Engineers, New York, December 2-6.

Los Angeles Nomads, Mayfair Hotel, December 11.

Houston Nomads, Old College Inn, Houston, December 30.

**1947**

**January**

Society of Automotive Engineers, annual meeting and engineering display, Book-Cadillac Hotel, Detroit, January 6-10.

## Canadian Crude Sources Listed in New Report

OTTAWA.—Canadian crude oil received at refineries in January 1946, totaled 3,602,548 bbl. (35 gal. per barrel), of which the United States furnished 1,839,600 bbl., or 51 per cent. Of the January imports of crude oil, totaling 2,999,898 bbl., the United States supplied 61.3 per cent, the balance coming from Colombia and Venezuela.

Comparable figures for January 1945, showed the United States supplying 1,342,381 bbl., or 46.5 per cent of the 2,885,209 bbl. of oil imported, and 37.5 per cent of the total oil received at refineries of 3,583,110 bbl.

The largest single source of Canadian crude oil was Illinois, with a total of 587,034 bbl. in January, followed by other Mid-Continent and California with 547,545 bbl. and 425,857 bbl., respectively. Canada's Turner Valley, and other fields, furnished 602,650 bbl. in January 1946, against 697,901 bbl. in January 1945, dropping 13.6 per cent. Other imports into Canada were Colombia, 295,739 bbl., and Venezuela, 864,559 bbl. In January 1945, imports from South America were, Colombia, 417,042 bbl.; Venezuela, 1,057,929 bbl., and Ecuador, 67,857 bbl.

Operations in Canadian petroleum refineries continued at a high level in January 1946, according to a new monthly report issued by the Department of Trade and Commerce, Dominion Bureau of Statistics. Refineries used 4,751,013 bbl. of crude oil in January 1946, a decline of 5.3 per cent from the 5,001,659 bbl. for the same month in 1945. Production of refined products amounted to 4,445,600 bbl., against 4,579,422 bbl. a year ago. Inventories of crude oil at refineries on February 1, 1946, totaled 3,924,495 bbl.

## Gasoline Ration Raised

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## Among the

# Drilling Contractors

**Jones, Shelburne & Farmer, Inc.,** of Oklahoma City, and Great Bend, Kans., has taken the contract to drill a test well on a 20,000-acre block in Lamar County, Texas, near the town of Paris. The drill site is on the J. C. Gambill farm in the A. W. Wright Survey.

**C. T. McLaughlin,** Midland, Tex., has the contract for Lion Chemical Corp. (subsidiary of Lion Oil Co.) 1 Strom, Section 198, Block 97, H&TC Survey, wildcat 12 miles west of Snyder, Scurry County, Texas.

**Rhodes Drilling Co.,** Abilene, Tex., has the contract for Warren Petroleum Co. and T. D. Morrow 1 Mrs. Ruby Russell et al, Section 18, S. Wallick Survey, wildcat 6 miles northeast of Fort McKavett, Menard County, Texas.

**Glenn Gillespie** has the drilling contract on the Paul R. Nagle 1 Whaley, which was drilling below 2,300 ft. in NW NW SE 15-23n-5e, southeast of Ralston, in Pawnee County, Oklahoma.

**Harbar Drilling Co.** is the contractor and has an interest in the Ed Swearer 1 Deal, in NE NE SW 25-18-37w, Wichita County, Kansas, which was reported shut down and waiting on orders at a total depth of 2,980 ft.

**Vierson & Cochran Drilling Co.** is contractor on the Sohio Petroleum Corp. 1 Parkey, in SW NW NE 14-4n-1e, northeast of the Pauls Valley field, Garvin County, Oklahoma. The well will be a 4,500-ft. or Bromide sand test, and is on a block of 700 acres.

**Kiowa Drilling Co.** has been awarded drilling contracts on four tests to be drilled by Potash Corp. of America, Carlsbad, N. M. Two of the tests will be in Graham County, Kansas, and one each in Barton and Newton counties, Kansas. The 1 Weber has been staked in NE SE NW 35-19-14w, Barton County, 2½ miles south of a dry hole drilled by Republic Natural Gas Co. in August 1945. Drilling operations have been started at both of the Graham County locations. The 1 Logue, in SW SW NW 17-6-24w, has been spudded. The 1 Waggoner, in SW SW NE 36-6-25w, was drilling below 1,800 ft. The fourth test is the 1 Bennett, in SW SE SE 19-5-23w, Norton County. Harry Aurand, geologist, has been retained to be in charge of drilling operations.

**Lester Drilling Co.,** Henderson, Tex., holds contract on the W. C. Feazel et al 1 S. L. Herold, in C NW SW 21-15n-16w, Caddo Parish, Louisiana. Test was rigging up.

**Arrow Drilling Co.,** Tulsa, has drilling contract on the Marathon Oil Co. 1 Mitchell, in SE SE NW 2-20n-2e, Payne County, Oklahoma, which was drilling below 2,810 ft. The test is on a spread assembled by T. E. Berry and assigned to Jack White, who heads the Marathon company, with headquarters in Stillwater, Okla.

**Lohman-Johnson Drilling Co.** is contractor on the Tide Water Associated Oil Co. 1 Joseph E. Kelly, in 24-5s-14w, Posey County, Indiana.

**Crow Drilling Co.** has been awarded drilling contract on the W. O. White et al 1 George Hudson, in C NE NW 8-16s-1w, Chicot County, Arkansas. Permit has been issued to drill to 6,000 ft. or to the Smackover lime. Test is 3 miles east and 1 mile south of Lake Village. Companies supporting the test are Tide Water

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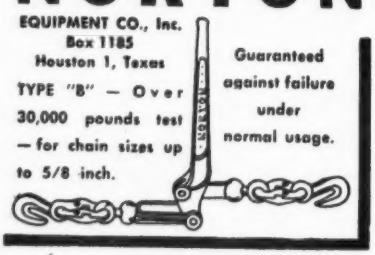


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Associated Oil Co., Carter Oil Co., and North Central Texas Oil Co. Same contractor has contract on the Austin Stewart and H. G. Lewis, Jr. 1 Hyrum Moore estate, which has been staked in C NW SE 14-16s-25w, LaFayette County, Arkansas. The test will go to 4,500 ft.

**Callahan Drilling Co.**, Oklahoma City, has been granted a permit to handle Class B freight interstate by the State Corporation Commission. The firm will be permitted to transport oil-field and drilling equipment and supplies and "such commodities as may require special equipment not supplied by Class A carriers."

**Five-Acre Drilling Co.** has been organized at Lubbock, Tex., by C. E. Riddell, W. H. Myers, E. E. Conant, and E. T. Conant.

**Hayes & Sprague** is the firm style of a new drilling concern that has been organized in Los Angeles. Organizers are R. P. Sprague, former general superintendent, and A. S. Hayes, former vice president of Loffland Brothers Co.

**Cook Drilling Co.** holds drilling contract on the Vaughey & Vaughey 1 Whitworth, in C SE 11-11n-3e, in the Vaughn-Pickens field, Madison County, Mississippi.

**Portable Drilling Co.** has the contract on the British-American Oil Producing Co. 1 Pannell, in SE SW NE 27-5n-4e, on flank of the old Bebee field, in Pontotoc County, Oklahoma. Test was ready to spud.

**Appleby Drilling Co.** is contractor for G. F. Aldrich 2 State National Bank of El Paso, Section 25, Block 140, T&STL Survey, 5,000-ft. wildcat 12 miles south of Imperial in Pecos County, Texas.

## Texas Association Opens Headquarters in Austin

HOUSTON.—Announcement of the opening in Austin of the permanent headquarters of the Texas Independent Producers and Royalty Owners Association was made last week by H. J. Porter, Houston, president.

Offices of the newly formed association will be in the Driskill Hotel in Austin with E. I. Thompson, Houston, executive vice president, in charge. A monthly meeting of the officials and the executive committee of 13 members will be held in Austin the night before each statewide hearing of the Texas Railroad Commission. Membership drives are now under way in the state's 12 railroad commission districts under the direction of the association's district vice president.


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# PERSONALS

*E. M. BUTTERWORTH*

## New Company Head Experienced In Work Abroad

E. M. BUTTERWORTH, new president of American Overseas Petroleum Co., has worked as a geologist in such widely scattered places as the Rocky Mountains, Alaska, Madagascar, and the Dutch East Indies.

His background of experience in foreign and domestic producing activities led the Petroleum Administration for War to make him a special representative during the war. He spent 2 years in this capacity on leave from Standard Oil Co. of California.

In 1916, he took a geology degree from the University of California and a year later, joined California Standard as a geologist in the Santa Maria, Calif., area. After subsequent work abroad, he returned to the United States in 1925 as district geologist for the company in Los Angeles, and in 1936, became assistant manager of the foreign producing department with headquarters in San Francisco. In July 1944 he became a vice president of American Overseas Petroleum when the company was organized.

**George W. Riley** has joined Big Chief Drilling Co. as drilling superintendent in the Permian Basin area of West Texas with headquarters at Odessa.

**N. R. Lamb** has joined the staff of New Mexico Bureau of Mines and Mineral Resources as petroleum engineer. He formerly was with the engineering department of Continental Oil Co.

**L. Charles Wallach,** managing director, and **W. C. F. McCarthy,** director, of Sterns, Ltd., London, England, petroleum marketing and manufacturing firm, are currently visiting Tulsa and other oil centers in the Southwest.

**Hugo Hester,** drilling foreman for Ohio Oil Co., has been transferred from California to take charge of drilling rigs at Haynesville, La.

**Byron Rife,** independent Texas operator, has returned to San Antonio following his separation from the Army. As an Army colonel Rife commanded the Army Ordnance Depot at Joliet, Ill., and received the Army Commendation Ribbon as well as the Legion of Merit. Earlier in the war he served as Army representative in charge of the Baytown, Tex., ordnance plant.

**Clyde Goodman,** chief geologist for Oklahoma Natural Gas Co., has resigned to enter the consulting field in Tulsa.

**Dr. Parke A. Dickey,** formerly associated with Quaker State Oil Refining Co. at Bradford, Pa., has joined Carter Oil Co. and will direct the geological phase of research activities at Carter's laboratory in Tulsa. Dickey spent several years in South America with Tropical Oil Co. following his graduation from Johns Hopkins University and later was associated with the Pennsylvania Geological Survey.

**Sir Frederick Godber** has been named chairman of the Shell Transport & Trading Co., Ltd., succeeding **Lord Bearsted** who retired on July 12 due to ill health. **Frank Hopwood** is slated to fill the vacancy of managing director of the major operating companies of the Royal Dutch Shell Group. Formerly, Godber held that position. Hopwood was resident in New York from January 1942 to May 1945 as president of both Asiatic Petroleum Corp. and Caribbean Petroleum Co. During that time he was active on Petroleum Administration for War industry committees, and was the British Petroleum Board's United States representative.

**H. C. O. Clarke,** superintendent of Pure Oil Co.'s Rocky Mountain division for several years, has been named manager of the Illinois producing division with headquarters at Olney as a part of a series of new appointments announced by Pure. **Raymond B. Kelly,** manager of the Illinois division for 6 years, becomes manager of the Texas producing division, with headquarters at Fort Worth. **R. W. McIlvain, Jr.,** now heading the Texas division, will become manager of the Rocky Mountain producing division with headquarters at Billings, Mont. Other changes involve **C. M. Harden,** division superintendent at Olney, who is transferred to a similar post at Billings; **H. L. Donhaiser,** former division superintendent at Saginaw, Mich., who replaces Harden at Olney, and **Guy J. Andersen,** former district superintendent at Reed City, Mich., who replaces Donhaiser at Saginaw.

*L. E. DANFORTH*

**Lester F. Danforth,** recently released Army major, has been named director of the Arkansas Oil and Gas Commission succeeding **E. M. Dutton** who resigned last month to enter private business in Brownwood, Tex. Before entering the Army, Danforth was superintendent of the materials department of Halliburton Oil Well Cementing Co. Formerly he was with Deep Rock Oil Corp. as production engineer, and later with Pure Oil Co. and Dowell Incorporated. In the Philippines during the war, Danforth was chief requirements officer responsible for petroleum products.

**T. E. Peak,** head of the engineering department of the Baton Rouge refinery of Standard Oil Co. of New Jersey, Louisiana division, has been transferred to the technical division as new projects coordinator. In two other changes, made under the refinery's new policy of shifting supervisory personnel "for broadening the experience and capabilities of division and department heads as well as other members of the supervisory group," **E. R. Wilkinson,** head of the equipment inspection department was named head of the engineering

department, and **C. R. Draughon,** former group head in the equipment inspection department, named head of the equipment inspection department.

**W. V. Hartmann,** vice president and a member of the board of directors, and in charge of marketing, of Gulf Oil Corp. and Gulf Refining Co., will end an active career of 58 years in the oil business July 1 when he retires. Hartmann also is vice president and a director of Gulf Research & Development Co. and a director of Gulf Exploration Co. and Gulf Tide & Supply Co. Forty-three of Hartmann's 58 years in the oil business have been with the Gulf organization.

**Don Miller,** regional production superintendent for Phillips Petroleum Co. at Amarillo, Tex., will move to Midland, Tex., to head the company's new regional production department covering West Texas and southeast New Mexico. The new office will be headquarters for production offices at Odessa, and Big Spring, Tex., and Hobbs, N. M.

**Carl Walling** and **Elmer Ledford,** pipe line engineers recently discharged from Army service, have rejoined the pipe line department of Ohio Oil Co. at Enfield, Ill. **Raymond Caldwell,** pipe line engineer, Centerville, Ill., rejoined the company after duty with the Navy.

**Austin Cadle** has been appointed manager of Standard Oil Co. of California's economics and statistical department to succeed **Earl W. Wagy** who is retiring. Cadle joined Standard in 1922 immediately following his graduation from Stanford University as a gelogist. Wagy has been with Standard 26 years.

*A. A. CURTICE*

**A. A. Curtice,** vice president of United Engineering Corp., S.A., is back in New York City after a prolonged stay in Peru where he aided the Peruvian Government in the formation of a new oil law.

**C. M. Foster,** superintendent of production for Gulf Oil Corp. in the Wichita Falls, Tex., district, has been transferred to the West Texas division, with headquarters at McElroy, Tex. **H. F. Fortenberry** succeeds Foster as superintendent at Wichita Falls.

**D. W. Coultis,** formerly with Royalite Oil Co. in Turner Valley, has left Banff, Alta., for Venezuela to become drilling superintendent for the Caribbean Oil Co.

**Dr. J. M. Hersh,** formerly of South Bend, Ind., has joined the research and development division of Cities Service Oil Co. at Bartlesville, Okla. He will handle patent matters for the division and do work in organic chemistry research.

**John S. Young,** petroleum engineer now employed by the California Conservation Committee, who as an Army ordnance officer served 33 months in the China-Burma Theater, has been awarded China's highest decoration, the Grand Order of the Cloud and Banner with an accompanying citation signed by Chiang Kai-Shek.

**W. W. Baker,** who has been connected with producing, natural gasoline, and pipe-line operations of Sinclair Oil Corp., has returned to the United States after spending 2 months in Venezuela. In Venezuela he inspected the pressure-maintenance and natural-gasoline plant construction program of the Venezuelan subsidiary of the Sinclair company now nearing completion.

*E. G. SEUBERT*

**Edward G. Seubert,** chairman of the executive committee of Standard Oil Co. (Indiana) and former president and chairman of the board of the company, retired last week on his seventieth birthday. Seubert, whose service with the company began in 1891—earlier than any other employe still on active rolls—was president from 1927 to 1929 and the company's chief executive from 1929 to January 1, 1945. For the last year and a half, he has headed the executive committee while an administrative team consisting of **Robert E. Wilson,** chairman of the board, and **A. W. Peake,** president, took up top management of the Indiana company. Following Seubert's retirement, **Rubert J. Lindquist,** financial vice president, was elected a director of the company.

**Carl E. Bolte,** who during the war was director of the industrial service division, Smaller War Plants Corp., in Washington, has been appointed executive secretary of the National Lubricating Grease Institute. He formerly was president of the National Millers' Association.

**Harry M. Batis,** has been named chief supervisor of the oil and gas division of the Texas Railroad Commission succeeding **C. W. Strance** who resigned several weeks ago. Batis was promoted from the position of chief accounting supervisor of the division.

**A. C. Long,** former manager of The Texas Co.'s executive sales division in the foreign sales department, has been named assistant to the vice president of foreign operations. Associated with Texaco since 1930, Long has seen service in numerous foreign and domestic sales capacities. During the war he spent about 14 months as petroleum attache in the U. S. State Department in London.

**Robert A. Hamilton,** chief materials man in Atlantic Refining Co.'s domestic production department, recently left Dallas for a 6 weeks' trip to Venezuela.

**T. H. Philpott,** Carter Oil Co., was elected president of the Shreveport (La.) Geological Society last week. **Brame Womack,** Sohio Petroleum Co., was chosen vice president, and **J. Edward Lytle,** Union Producing Co., secretary-treasurer.

**T. W. McGuire,** formerly superintendent, Cotton Valley Operators Committee, has been named general manager, succeeding **J. R. Butler,** who recently resigned to become vice president of the newly organized Old Ocean Oil Co.

**Charles U. Bay,** president of Bay Petroleum Corp., recently appointed ambassador to Norway, was entertained in Denver before his departure for his new post at a party given by **Roland V. Rodman,** vice president and general manager.

**Franz von Schilling** has been named assistant manager of The Texas Co.'s European and African divisions, foreign sales department. Since 1942 von Schilling has been on military leave of absence from the California Texas Oil Co., Ltd. (jointly owned by Texaco and Standard Oil Co. of California) and only recently was discharged from the Navy.

**Paul G. Benedum,** Houston, recently released Army colonel, has been named executive vice president and a director of Hiawatha Oil & Gas Co., a director and vice president of Republic Pipe Line Co. and Duval Pipe Line Co., and a director of General Oil Sales Corp. Benedum served 3 years as chief of the facilities and production section of the aviation petroleum branch of the Army Air Force.

# Equipment Men in the News

## Pritchard Company Adds Two

J. F. Pritchard & Co. has recently added two technical men to the staff of its chemical division at the company's headquarters in the Fidelity Building, Kansas City, Mo.

*WILLIAM BODLE*

*L. E. COLBURN*

They are William Bodle, who will be an assistant to Dr. W. W. Deschner, manager of the chemical division, and L. E. Colburn, a process engineer.

## Henderson Joins Lufkin

Glenn Henderson, veteran oil-field sales and service engineer in the California fields, recently joined the sales staff of Lufkin Foundry & Machine Co. and will be located in the Los Angeles office. Henderson has a record of 27 years in oil-field sales work in the California fields, dating from 1920 when he started with D & B Pump Supply Co. In 1933, upon the purchase of the company by Emsco, Henderson was manager of the San Joaquin Valley division. Since that time he has been acting as vice president and sales manager of Mills Alloys, Inc., with Parkersburg Rig & Reel, and later as manager of the oil-field division for Pacific & Western Gear Works.

## Mud Products, Inc., Opens in Tulsa

Mud Products, Inc., announces the opening of general offices in the Philtower Building, Tulsa. The company is an authorized distributor of Baroid Sales Division, National Lead Co. In addition to a complete line of Baroid products this company will have available for its customers all chemicals and lost-circulation materials necessary for the proper treatment of drilling muds.

E. R. Albert, Jr., has been made general sales manager of the corporation. Albert has been associated in sales and service of drilling mud for the past 12 years. He has just finished 7 years with Baroid Sales Division, his last position being that of division engineer and field-service supervisor for the Mid-Continent area.

Division offices have been established at Duncan, Okla., and Great Bend, Kans. Ben R. Bourland is division manager over Oklahoma and North Texas and Keith Bidwell is division manager over Kansas and the Panhandle area. Warehouse stocks have been established in Oklahoma, Kansas, and the Texas Panhandle.

## McKee Opens Chicago Office

Arthur G. McKee & Co., Cleveland, designing and construction engineers in the petroleum refining and iron and steel industries, announces the opening of a sales office in Chicago in the McCormick Building. Macauley Carter, who has been identified with oil-refining engineering and construction for over 20 years, will be in charge of this new office.

## Warner Lewis Co. Acquires Flotrol Systems, Inc.

Warner Lewis Co., Tulsa, has acquired full ownership of Flotrol Systems, Inc., and will move Flotrol headquarters from New York City to Tulsa July 1, according to an announcement by Warner Lewis, president.

Recently the company purchased a warehouse and office building in Tulsa. The building has facilities for heavy warehousing and storage and is adjacent to trackage.

## Double Seal Will Maintain Stock at Tulsa

Double Seal Ring Co., Fort Worth, announces that a full warehouse stock has been placed in Tulsa in order to better serve its Mid-Continent customers. Jim Ritchie, Mid-Continent representative, will maintain the stock at his headquarters 118 South Cheyenne.

## Earl Rees Takes South American Trip

Earl M. Rees, of Patterson - Ballagh, left May 30 for an extensive tour of South American oil-producing centers. His itinerary calls for stops at Trinidad, all of the oil-producing areas of Venezuela, Colombia, Ecuador, Peru, Central American countries, and Mexico. He will be gone 5 months, making the complete journey by air.

## Berry Joins Axelson's Rocky Mountain Staff

*R. E. BERRY*

Axelson Manufacturing Co. announces the addition to its Rocky Mountain staff of R. E. "Skeet" Berry. Berry was formerly employed by Axelson prior to his entrance into the U. S. Navy from which he was recently retired to inactive duty, holding the rank of lieutenant. The addition of Berry to this division will augment the services of Harry McCoy.

## McKinney Addresses A.S.M.E.

The twenty-fold expansion of the diesel-engine industry during World War 2 is only a start toward the place diesels will take in supplying power for industry in the future, declared A. W. McKinney, vice president of National Supply Co. McKinney spoke at the annual meeting in the Schroeder Hotel, Milwaukee, of the Oil and Gas Power Division of the Amercian Society of Mechanical Engineers.

## Bartlett Rejoins Cooper-Bessemer

R. F. (Ted) Bartlett, Jr., has rejoined the staff of the Dallas office of The Cooper-Bessemer Corp. as sales engineer, following 5 years of service in the Army, A. A. Burrell, branch manager, announced.

## Bank Names Officials

The First National Bank & Trust Co. of Tulsa announces the advancement of J. P. Byrd, Jr., to the office of vice president and assistant to the president, and the election of R. Elmo Thompson to the office of vice president.

## Collins With Murray Tool

E. L. Collins, manager of machinery sales, Gulf Coast Division of Oil Well Supply Co., Houston, for the past 1½ years, has resigned to become manager of Murray Tool & Supply Co. at Oklahoma City.

## AMERICAN IRON WORKS ANNOUNCES CHANGES

***American Iron & Machine Works Co. recently held a general sales meeting at Oklahoma City, for the purpose of discussing new and improved methods of service to the oil industry. Final meeting of the 3-day session was a banquet in the Beacon Club where above photo was made***

Scott Thompson, formerly chief engineer for W. C. Norris, is now with American Iron & Machine Works Co. of Oklahoma City, in the capacity of special production development engineer. Eddie H. Royle, who has just returned from the service as a pilot in the European theater, is now located in Wichita Falls. He will represent the company in the Fort Worth, Dallas, and North Texas territory.

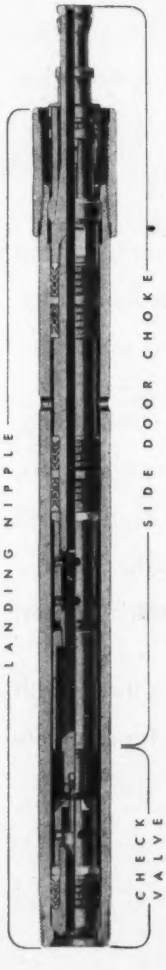
# STANDARD EQUIPMENT

## OTIS SUB-SURFACE CONTROLS

FOR

# DUAL COMPLETIONS

## THE OTIS TYPE L REMOVABLE SIDE DOOR CHOKE




THE OTIS
TYPE L REMOVABLE
SIDE DOOR CHOKE

The OTIS SIDE DOOR CHOKE is universally accepted as *standard equipment* for use in conjunction with a packer in completing and producing two-zone flowing wells — regardless of depths, temperatures, and pressures. The complete Side Door Choke Assembly consists of three parts:

1. **The Type L Landing Nipple,** made up in the tubing string when the tubing is run, provides four ½" horizontal ports from the tubing bore to the casing annulus and serves as a definitely located seat for the Side Door Choke and Check Valve. The horizontal ports are opened and closed by running and pulling the Side Door Choke.

2. **The Side Door Choke,** run and pulled under pressure on a steel measuring line, is comprised of a pack-off section mounted with four sets of improved vee type packings, spaced to seal above and below the side ports against pressure in either direction, and a locking device so designed to positively lock the Choke in the Landing Nipple.

3. **The Check Valve** made up of a ground seat drop check valve mounted on a packing mandrel carrying one set of vee type packing, prevents flow from the upper zone down through the Type L Landing Nipple into the lower zone. The Check Valve seats at the bottom of the Landing Nipple and is run and pulled on a steel measuring line.

*Multiple uses* for the Otis Type L *Removable* Side Door Choke in *multiple completions* include its use in circulating out or reconditioning mud in the tubing-casing annulus above the packer; serving as a removable jet collar in gas lift operations; and to facilitate taking independent pressures from each zone of a two-zone well, acidizing one zone independently of the other zone, and kicking off the annulus should it become loaded up.

OTIS

OTIS PRESSURE CONTROL, INC.

FIELD OFFICES: TEXAS: HOUSTON, CORPUS CHRISTI, and LONGVIEW. OKLAHOMA: OKLAHOMA CITY. NEW MEXICO: HOBBS. LOUISIANA: NEW IBERIA
OTIS ENGINEERING CORPORATION—MANUFACTURE AND DEVELOPMENT
DISTRIBUTORS: OTIS PRESSURE CONTROL, INC., DALLAS, TEX.; OTIS EASTERN SERVICE, INC., BRADFORD, PA.; WESTERN PRESSURE CONTROL, LOS ANGELES, CALIF

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for the
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Many years of working together as a team, solving the most complex problems soundly and economically, have proven that this team can Engineer any job.

Problems in concrete, foundations, structural steel, piping, steel fabrication, and power plants, electrical systems, pumping plants, boiler plants, compressor stations, all have been engineered, separately and together, in the creation of process and chemical plants of many types.

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# BROWN & ROOT, Inc.

# CONCENTRATED EFFORT

## *Assures Maximum Results*

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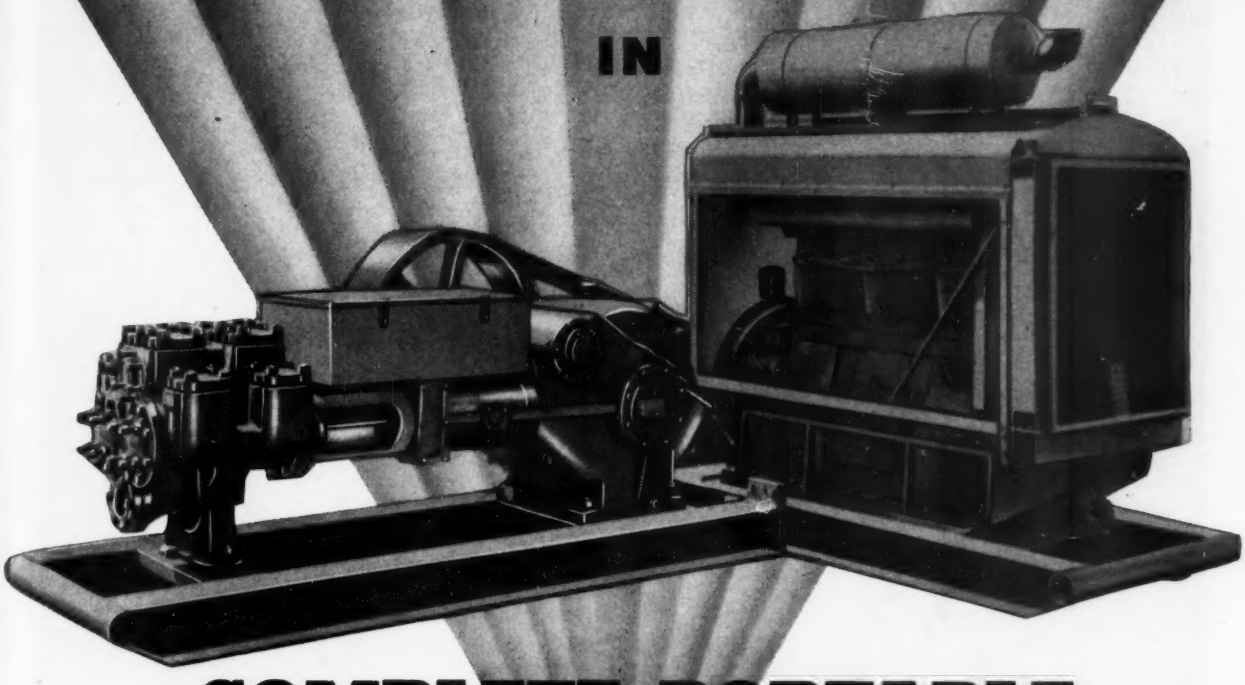

# COMPLETE PORTABLE PUMPING UNITS

• We have chosen as our major assignment in life the specific task of meeting the pumping problems of the oil industry.

We concentrate all our skill, study and experiment on this particular job. We keep in touch with developments in our field through first-hand contact with production and pipeline executives and constant on-the-job study of operating conditions.

Isn't it natural that through such concentration we should develop pumps and pumping units that offer *more* in adaptability to the job, day-in-and-day-out dependability and low-cost performance? And this being so, isn't it good business to make Gaso your first source of supply for complete portable pumping units?

**GASO PUMP & BURNER MFG. CO.**

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# *GASO PUMPS*

## *for every oil industry need*

THERE'S A LOT OF

"PEACE of MIND"

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ARCOS ALLOY ELECTRODES

NOW AVAILABLE

46 ARCOS GRADES

for Stainless Steels
Chrome-Nickel and Straight Chrome Electrodes

for Low Alloy Chrome Steels
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for High Tensile Steels
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Kingsport, Tenn. ..... Blip-Not Belting Corp.
Knoxville, Tenn. ..... Blip-Not Belting Corp.
New Orleans, La. ..... The Gulf Welding Equipment Co.
Oklahoma City, Okla. ..... Hart Industrial Supply Co.
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Phoenix, Arizona ..... Arizona Welding Co.
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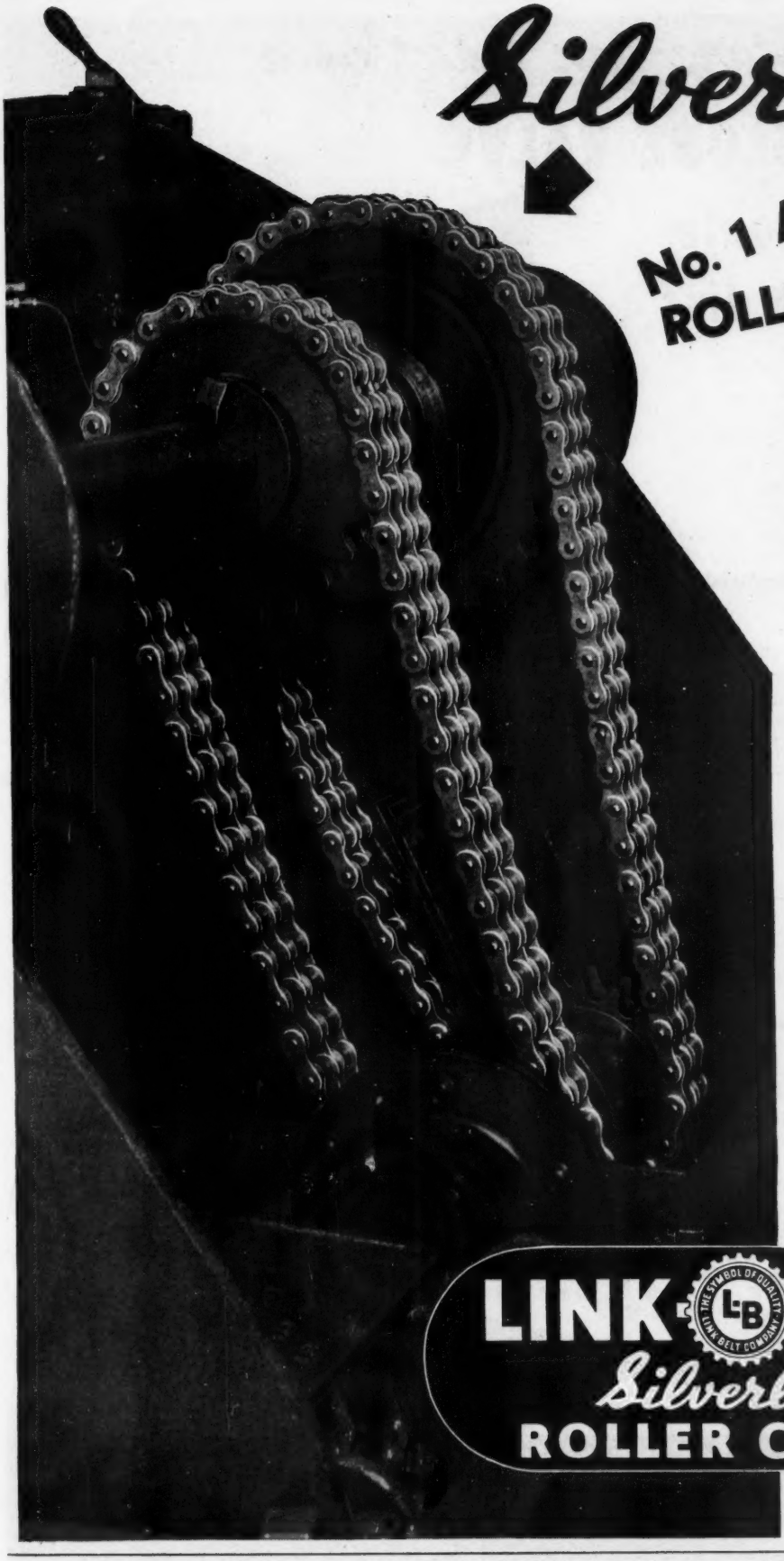
# Silverlink

## No. 1 AMONG ROLLER CHAINS



● This modern, high speed, portable drawworks is chained up to drill to pay sand with maximum speed and efficiency, and with minimum trouble. Among its numerous advantages is the combination of Link-Belt Silverlink finished steel roller chain and sprockets, a section of which is pictured here.

Rig manufacturers, like rig owners, agree on Silverlink . . . that its accurately finished all-steel construction, high standards of precision, great strength yet light weight, flexibility, and its ability to withstand shock make it the top performer in roller chains. They can safely depend on Silverlink. Link-Belt's 68 years of continuously improving chain is their insurance.

**LINK-BELT COMPANY**

Builders of the Most Complete Line of Power Transmission Machinery

Indianapolis 6, Dallas 1, Houston 2, Los Angeles 33, Kansas City 6, Mo., New York 7, Toronto 8. Distributors in all fields.

Link-Belt Engineers have developed a construction that makes assembly and disassembly of multiple width chains in the field much easier. The press fits between chain pins and center sidebars have been eliminated, but load distribution across the width of the chain has been maintained.

9481

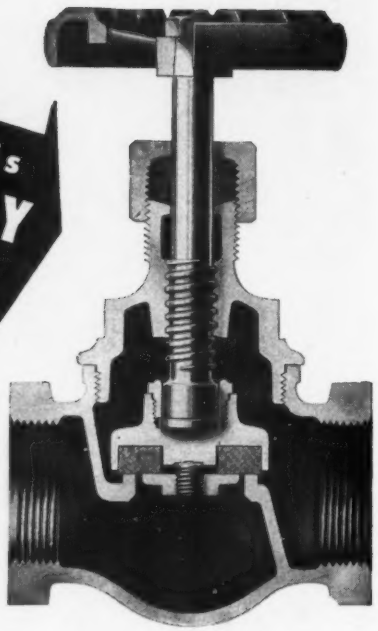
LINK-BELT
Silverlink
ROLLER CHAINS


The Oil and Gas Journal, published Saturdays by The Petroleum Publishing Co. Entered as second-class matter at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly.

*Every feature you want in a*

# BRONZE GLOBE VALVE with renewable composition disc

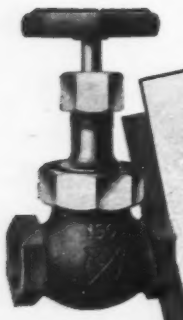
is in this KENNEDY DESIGN



Here is a renewable composition disc bronze globe valve with special features that make it an outstanding value . . . for its features give you extra conveniences, extra service, and extra maintenance savings at no extra cost.

For example, look at the disc . . . the heart of the valve. The disc holder is accurately guided in the body by four guide prongs which prevent tipping or binding, and its stem head recess has a milled bearing surface which permits it to swivel freely. When the stem is turned to wide open position, this slip-on disc holder becomes locked in place so it cannot fall off when the valve is taken apart, but a half-turn of the stem releases it for removal.

Then, too, notice the unusual height of the seat, which gives longer use of the disc before renewal. These are but a few of the extra values of this 150-lb. valve which is fully described in the 240-page Kennedy Catalog. Write for your copy today.



## YOU WANT THESE VALVE FEATURES

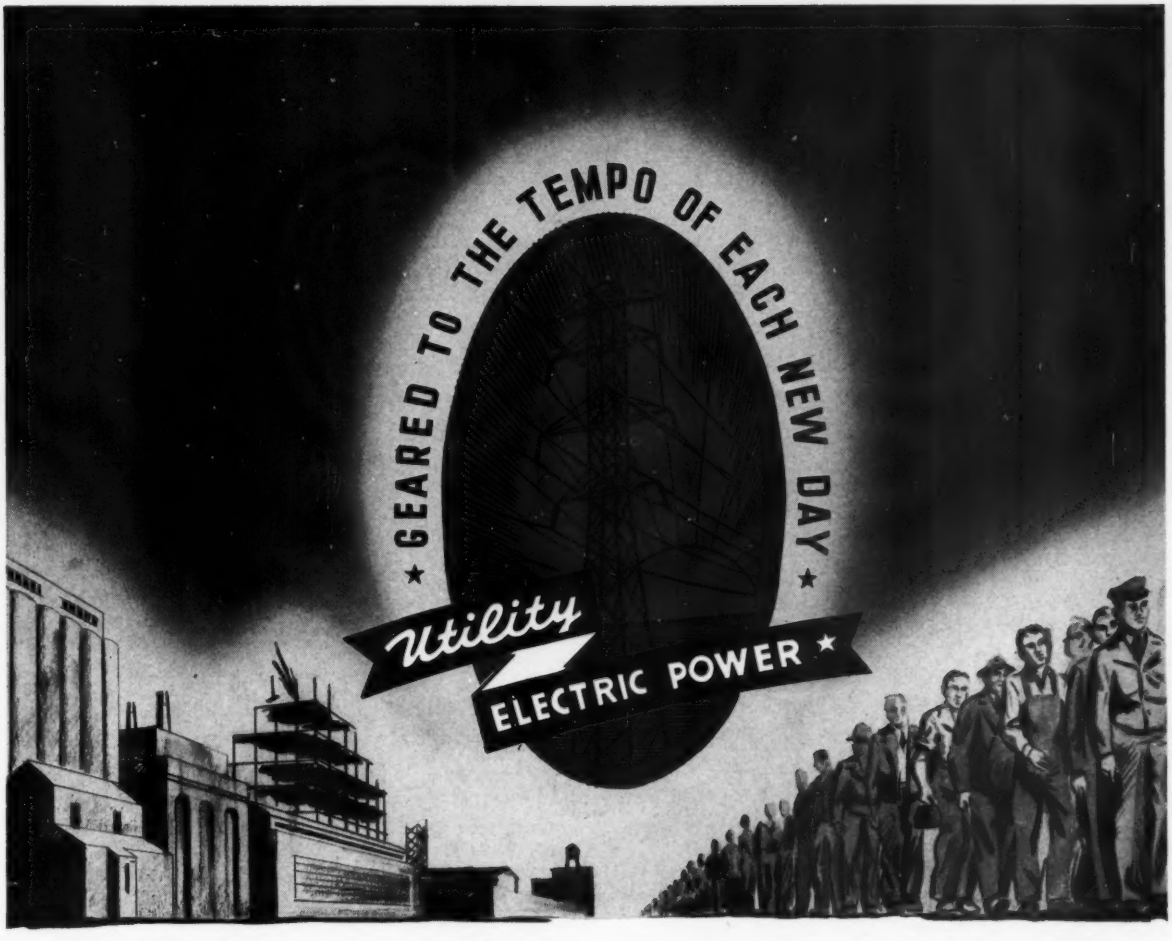
. . . you'll find them in this KENNEDY design

1. **Generous Strength . . .** Body and bonnet are of high-grade dense metal with ample thickness and rounded fillets. Stem has large diameter and extra large number of contact threads.
2. **Easy Operation . . .** Stem and stem contact surfaces are accurately threaded. Deep stuffing boxes permit tightness without undue pressure on packing. Large hand-wheel gives firm, comfortable grip.
3. **Lasting Tightness . . .** Discs and seats seat accurately, and their sturdy design resists distortion and has special provisions for take-up of wear.
4. **Long Life . . .** Many Kennedy valves have been in daily use a quarter century and more.
5. **Convenient Repacking . . .** Glands and packing are easily accessible.
6. **Economical Maintenance . . .** Long wear built into all parts, and adjustments or other attention are seldom required.

**THE KENNEDY VALVE MFG. CO.**
Elmira, New York

KV-112

**KENNEDY** *valves - pipe fittings - fire hydrants*

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Cast iron as an engineering material has found fresh favour with the advent of high duty irons. The materials, in strength, soundness and physical properties, are a great improvement on the best cast iron of a generation ago. Workington irons enjoy unusual confidence amongst foundry men, particularly for special duties. The unique conditions existing at Workington contribute to the production of superior irons. The pure hematite ores are mined locally and, with rigid control throughout all processes, result in a product having a low sulphur and phosphorus content. All iron manufactured is machine cast and is free from sand and awkward pieces. Refined irons are also made from virgin metal without remelting or the addition of scrap. They are therefore eminently suitable for the production of malleable iron and special castings. Workington pig iron is used as the basis of the finest acid steels.

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USP. 45

# WALTER Tractor Trucks HAUL ANYTHING . . Anywhere!

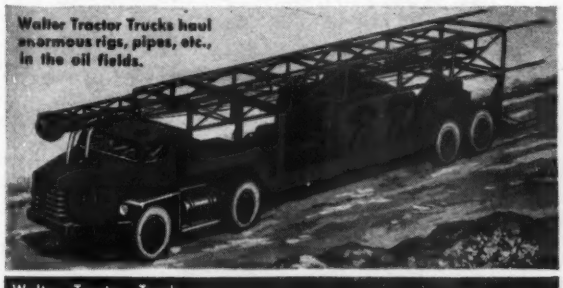
Walter Tractor Truck with 20 cu. yd. Semi-Trailer loaded with 40 tons of Iron Ore.

## Unequalled traction and power pull huge loads through toughest terrain

● The bigger the loads, the tougher the running, the steeper the grades — the more you need Walter Tractor Trucks. In mining, logging, oil fields, construction . . . wherever tough hauling jobs exist . . . you find Walter Tractor Trucks doing the "impossible." They are hauling payloads ranging up to 60 tons, through broken ground, slippery surfaces, mud and up steep grades — at speeds that make every hauling hour more productive.

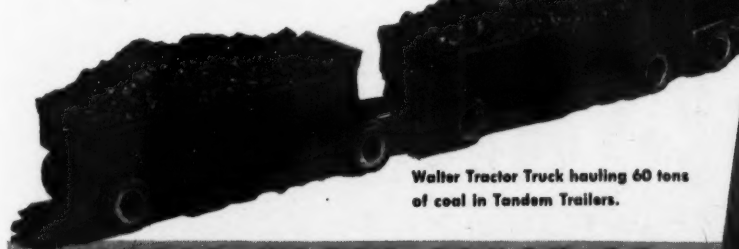
Motor power alone cannot accomplish these hauling feats. It takes the unique Walter drive system . . . Four Point Positive Drive . . . to provide the necessary traction to utilize every horsepower. In this drive, three automatic locking differentials proportion the power to each of the FOUR driving wheels according to its traction at any instant. They never send power to slipping wheels, as in conventional 2- and 4-wheel drives. There is never any wheel spinning to bog down loads, gouge roads or grind tires.

Other valuable features include a final drive mounted above — not in — the axle, to provide high ground clearance, and protection against load strains and road shock; tractor type transmission for increased gear capacity; engine-ahead-of-wheels for correct weight distribution and shorter turning radius. Write for detailed literature.



Walter Tractor Trucks haul enormous rigs, pipes, etc., in the oil fields.

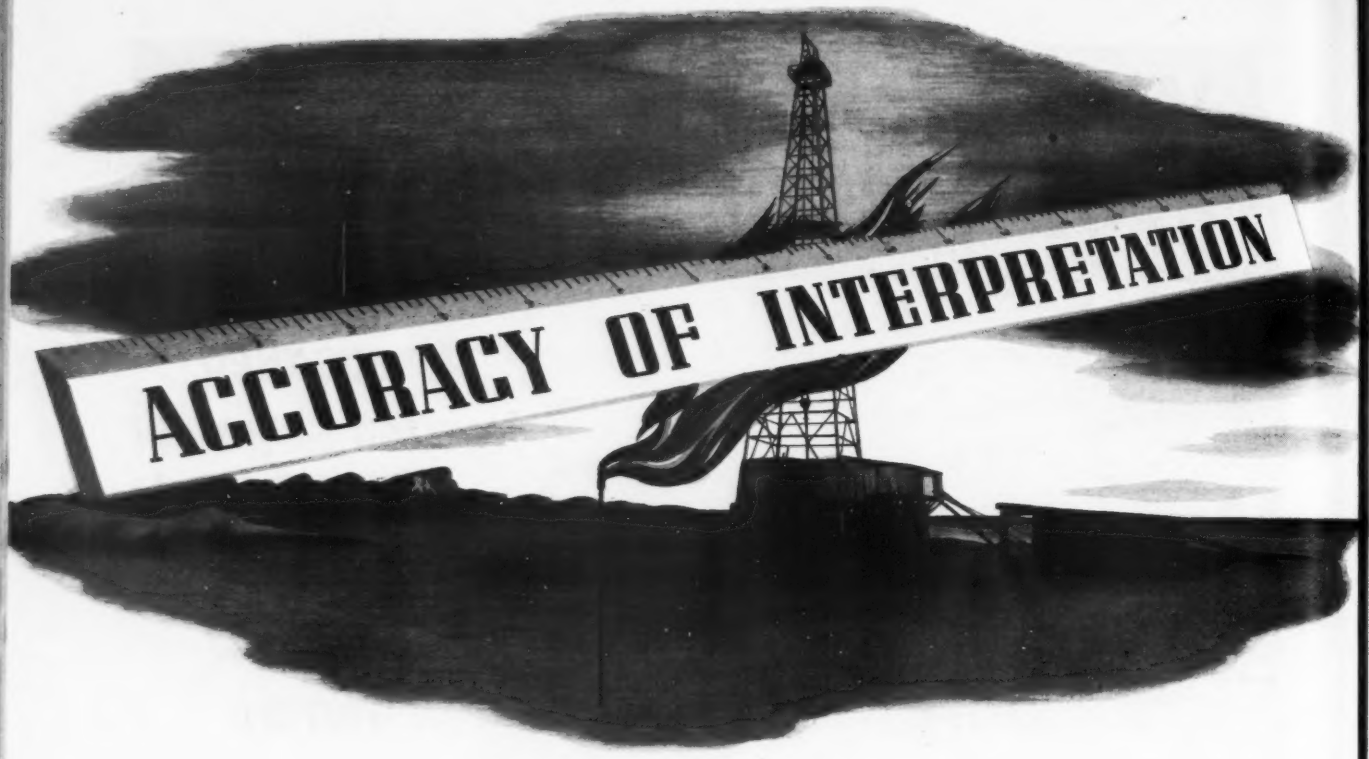
Walter Tractor Truck with 12 cu. yd. 20 ton payload capacity dump body.



Walter Tractor Truck hauling 60 tons of coal in Tandem Trailers.

**WALTER MOTOR TRUCK CO.**
1001-19 IRVING AVENUE, RIDGEWOOD 27, QUEENS, L. I., N. Y.

**WALTER TRACTOR TRUCKS**




**The true yardstick for measuring the value of any seismograph exploration service is *accuracy of interpretation* . . . either condemning or approving acreage. To those operators planning an exploration campaign we issue an invitation to investigate our record of operations, which provides unquestionable proof of the accuracy of our interpretations.**

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Established 1932

*for Production Welding or Brazing* **THERE IS NO BETTER TORCH THAN THE...**

# AIRCO STYLE 9903

HERE is a welding torch designed by AIRCO to be light in weight for easy handling and full freedom for operator, yet strong and durable for many tougher jobs... *ideal for welding barrels, tanks, refrigerator units, airplanes, piping installations and garage work.*

- Especially suited where production work is carried on for long periods of time. Operates from 3/16" I.D. light-weight flexible hose.
- Single-flame, *swaged-type* pure copper tips, generally preferred by welders, supplied unless otherwise specified. These tips cover a welding range from 1/16" to 1½" plate.
- Styles 721 Single type and 722 Dual-type Multiflame Heating tips, shown detached from torch, are ideal for silver brazing, applying hard-facing overlays and many other applications. Both tips are annealed for bending.

**FOR FLAME CUTTING, TOO**

The Airco Style 9903 torch can be converted rapidly into a light-cutting torch simply by replacing mixing head and tip with cutting attachment. Available with either 75° or 95° angle head.

**Write your nearest Airco office for Catalog ADC-617, or address:** Air Reduction, General Offices, 60 East 42nd St., New York 17, N.Y. In Texas: Magnolia Airco Gas Products Co., General Offices, Houston 1, Texas. Represented Internationally by Airco Export Corporation.

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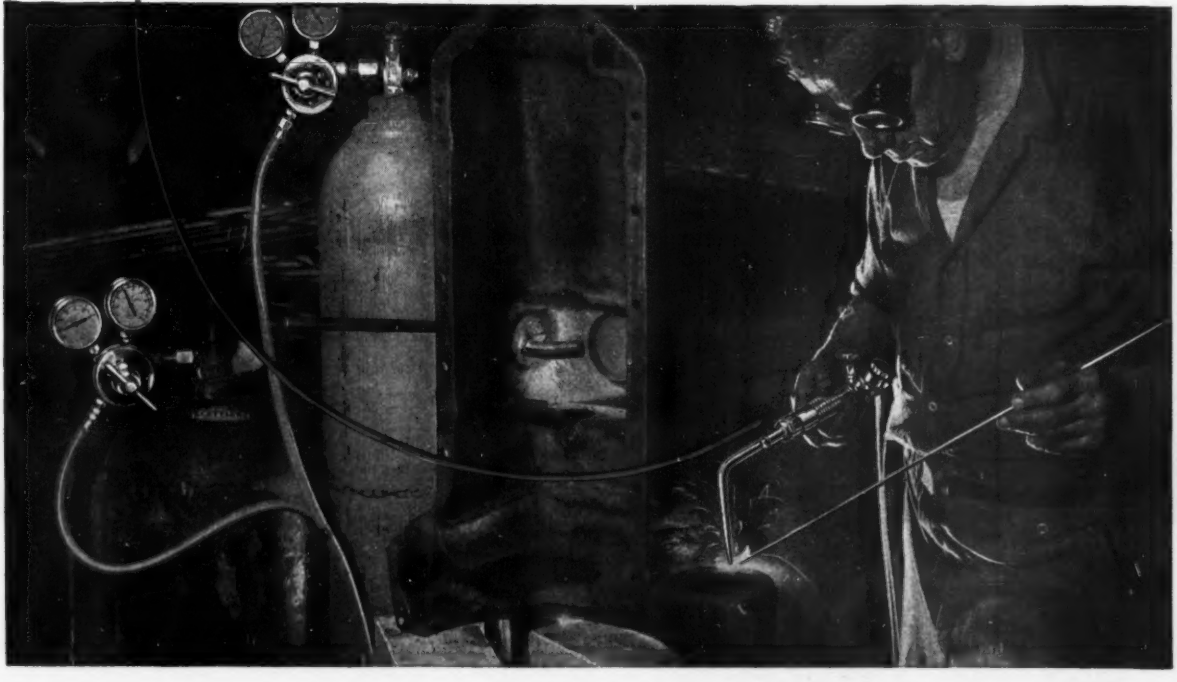
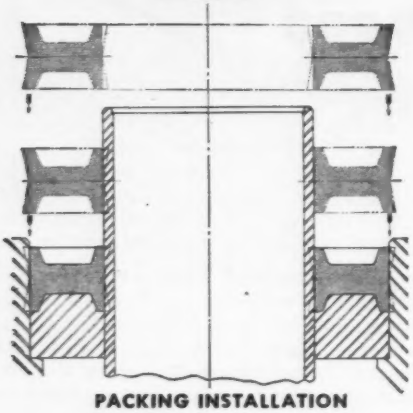


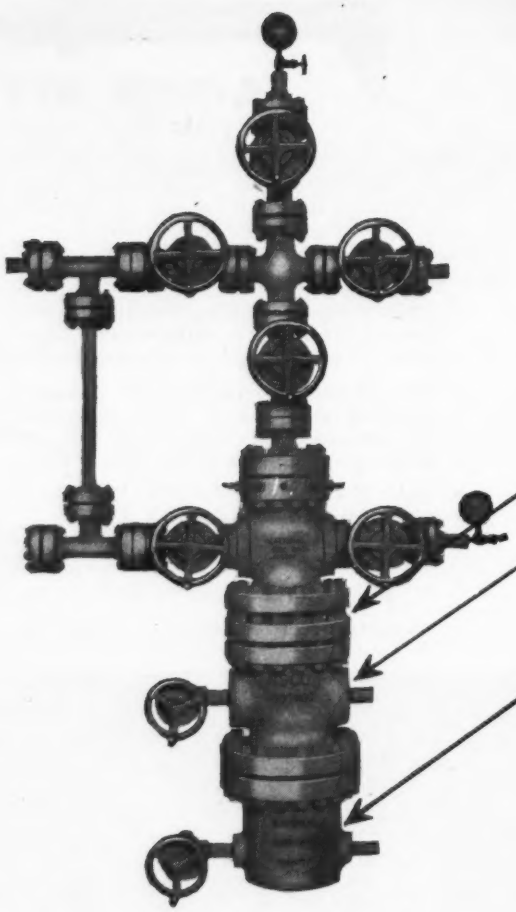
PACKING



PACKING INSTALLATION

PACKING SUPPORT

PACKING SPACER



**THE NATIONAL SUPPLY COMPANY**

GENERAL SALES OFFICES: TOLEDO, OHIO • DIVISION OFFICES: DENVER • FT. WORTH • PITTSBURGH •

EXPORT: NATIONAL SUPPLY EXPORT CORPORATION, 30 ROCKEFELLER PLAZA, NEW YORK, N. Y., U. S. A.; RIVER PLATE HOUSE,

# NATIONAL WELL-HEAD EQUIPMENT OFFERS THIS *Pressure Packed* FEATURE

**THE INNER SEAL:** Type "B" Pressure Pack packings are a new application of an old hydraulic principle which utilizes a pressure differential to produce the sealing action. The higher the pressure differential, the tighter the seal. Type "B" packing is designed to produce an initial tension in the lip around the casing and an initial compression in the lip inside the housing, thus insuring that a differential is set up with either gas or fluid pressure in terms of ounces.

Type "B" Packing is of double-lip construction which insures positive sealing regardless of whether a higher pressure exists in the lower annular space due to ineffective cementing and high pressure sands, or in the upper annular space.

The specially compounded, tough, oil-resistant plastic will not extrude or disastrously deform under well pressure loads. The absence of high initial loads prevents extrusion between the packing support and the casing, the former of which must have clearance to allow for variation of casing size and assembly.

Type "B" Packing is self-activating and since it does not require high preload stress to make it function, nullifies the danger of collapsing casing with loads imposed by the packing, a danger ever present when packing effectiveness relies on human adjustment or the tension requirements of the casing. This packing, being self-locating, transmits the load to packing support, or spacer rings which are contoured to conform to the packing shape. The support ring transmits the load to the housing.

The packings are easily installed: Grease the packing to make it slip readily, use any flat piece to stretch the inner lips around the casing, and compress the outer lips into the body, push the packing down, and the job is finished.

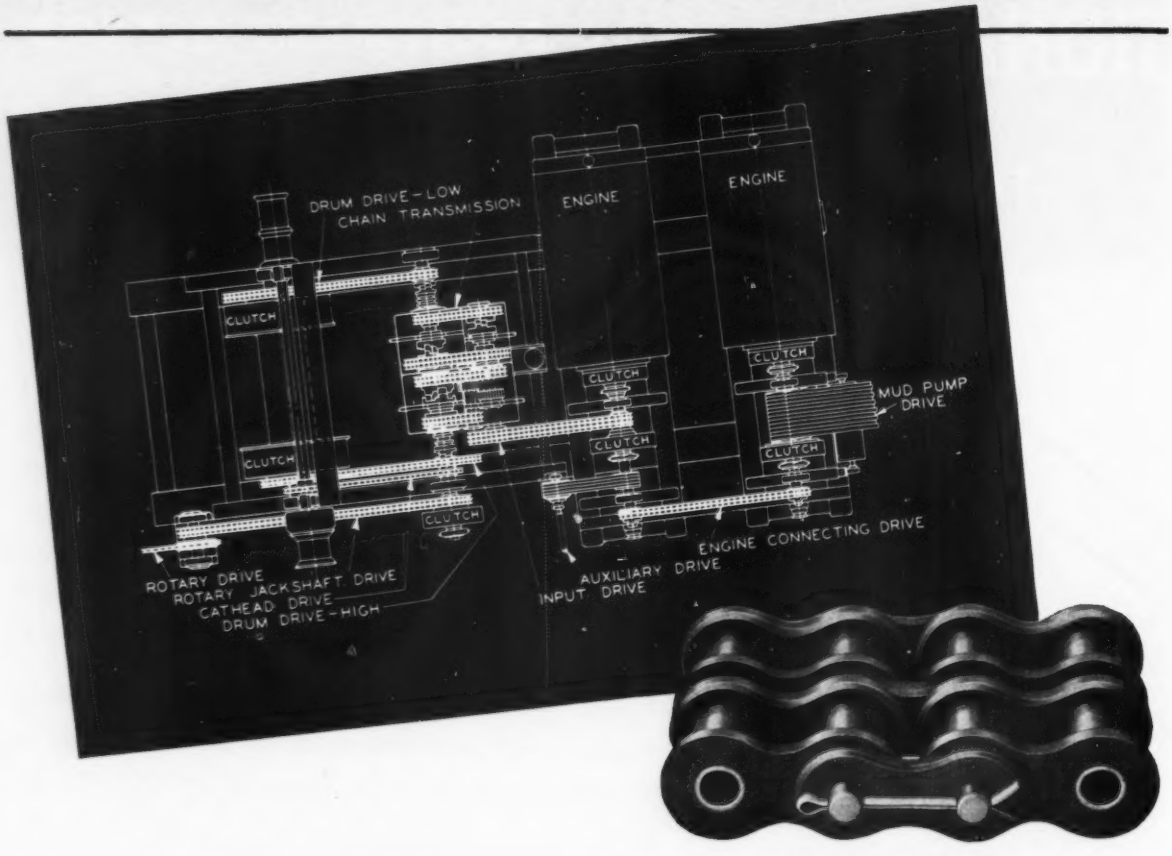
TULSA • TORRANCE

12 SOUTH PLACE, LONDON, E. C. 2.

*First in Quality* — THE NATIONAL SUPPLY COMPANY

NATIONAL BLUE PRODUCTS

# To Get More from Mechanical Rigs...

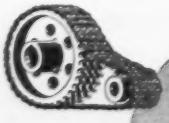



## REPLACE WITH BALDWIN-REX!

You can restore efficiency on your mechanical rigs by replacing worn or failing chains with Baldwin-Rex, the reliable roller chain.

Baldwin-Rex roller chains have the engineered-in stamina to handle the heaviest loads . . . the highest speeds . . . to absorb the terrific shock loading of modern deepwell drilling. For example, an outstanding feature that means added years of dependable service is the exclusive copper-plating of the rivet ends. This permits the best possible riveting and, at the same time, the optimum case depth and hardness on the rivet shank.

There are many other reasons why Baldwin-Rex roller chains can help you get more from your mechanical rigs. Your Baldwin-Rex engineer will be glad to give you all the facts. Replace with Baldwin-Rex for better service.



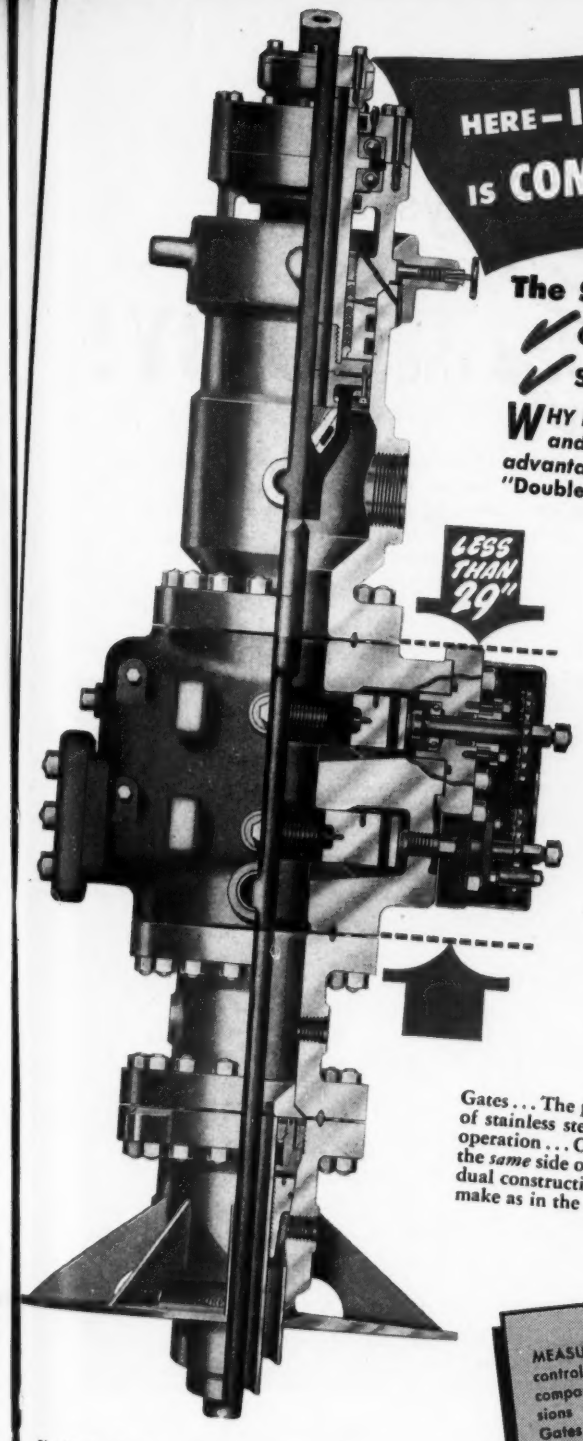
**BALDWIN·REX**

**ROLLER CHAINS**

Baldwin-Rex roller chains are for sale in all oil fields. For information, ask your Baldwin-Rex Field Engineer or write direct to:

**BALDWIN-DUCKWORTH DIVISION OF CHAIN BELT COMPANY**
357 Plainfield Street, Springfield 2, Massachusetts

# HERE—IN LESS THAN 29 INCHES—
# IS COMPLETE CELLAR CONTROL GATE PROTECTION!




The Shaffer Double Gate in combination with the Shaffer Combination Rotating Blow-Out Preventer and Stripper (top) and Shaffer Landing Base (bottom).

## The Shaffer "Double" Cellar Control Gate

✔ CUTS CELLAR SPACE TO A MINIMUM!

✔ SLICES INSTALLATION AND MAINTENANCE COSTS!

**WHY RUN UP the cost of your rig installations with unnecessarily deep cellars and extra concrete work when you can get the unusual space-saving advantages of the Shaffer "Double" Cellar Control Gate? And the Shaffer "Double" Gate not only cuts installation costs to the bone, but also enables you to boost operating efficiencies for the entire life of the well, because shallow cellars are easier to get in and out of — equipment is easier to install, maintain and change as development of the well is carried out!**

The Shaffer "Double" Gate combines in ONE body the TWO gates necessary for complete pressure control . . . the gate in the upper compartment for closing around the drill pipe—and the gate in the lower compartment for closing off open hole. Thus, in the *one* Shaffer "Double" Gate you have complete well control at all times, *regardless of whether the pipe is in or out of the hole!*

But the really important point is this—the Shaffer Double Gate is so amazingly compact it requires *less than half* the vertical cellar space required by two single gates and a connecting spool. Check the table below. See what this means in terms of valuable savings in cellar space. Note that even in the largest sizes the Shaffer Double Gate requires *less than 29"* overall, and in the smaller sizes, overall dimensions are even less. Think what this compactness means in saving costly cellar space!

**Still another space saving advantage** that you get in the Shaffer Double Gate is elimination of the usual mud cross. The body below the lower rams can be equipped with either 2" or 3" outlets to serve as a mud cross, thus completely eliminating need for this unit and further cutting overall height as well as minimizing equipment needs and installation operations.

### EMBODIES ALL SHAFFER ADVANTAGES

In spite of its unusual compactness, the Shaffer Double Gate incorporates all of the famous features that are engineered into standard Shaffer Single Gates . . . The pipe rams are self-centering for positive shut-off—and all operating screws are of stainless steel equipped with thrust bearings to reduce friction and assure fast positive operation . . . Operating screws on both upper and lower compartments have extensions on the *same* side of the gate, permitting remote control from *one* centralized point . . . Although dual construction combines two gates into one body, ram changes are as simple and easy to make as in the single gates.

**MEASURE** the height dimensions of any other control equipment on the market and then compare them with the overall vertical dimensions of the Shaffer Double Cellar Control Gates shown below. You will readily see why Shaffer Gates make such great savings in your cellar space requirements.

| Size in Inches | Height "A" Without Flanges |
|---|---|
| 6⅜"-7" | 23" |
| 8⅝"-9"-9⅝" | 25⅛" |
| 10¾"-11¾" | 27" |
| 12¾"-13⅜" | 28½" |

You can get Shaffer Double Cellar Control Gates in a complete range of sizes from 6⅜" to 13⅜" inclusive, and they have the same working capacities as other Shaffer Gates. An investment in these gates is one that will last over the life of many, many wells. So why not start saving *now* on future cellar space requirements by adopting Shaffer Double Gates as standard well equipment. Your nearest Shaffer representative will be glad to give you complete details on this equipment—or write direct.

**See the Shaffer section—pages 2687 to 2730—of your Composite Catalog for further details on Shaffer equipment!**

# SHAFFER

HIGH-PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

SHAFFER TOOL WORKS, Brea, Calif. • California Service Shops: Santa Fe Springs and Taft • HOUSTON, TEXAS, 6006 Navigation Blvd. • ODESSA, TEXAS, 1925 W. 2nd St. • OKLAHOMA CITY, OKLA., Acme Oil Tool Co., 1001 S. E. 29th St. • EXPORT SALES OFFICE: Shaffer Tool Works, 30 Rockefeller Plaza, New York, N. Y., U. S. A.

Send for the complete Shaffer catalog and see the many unique Shaffer-engineered features that will save you money on pressure control work, fishing operations, and other oil field requirements!

# here are some ways to give *Blow-By* the GO-BY!

If you want to avoid blow-by in new diesel engines—or stop it in old ones—the place to start is with *proper rings.*

Koppers engineers have done a lot of work on the problem, and have come up with the right answers for a wide variety of conditions. An improved pressure pattern with higher pressures at the joint in the rings; greater emphasis on flatness and finish, to prevent ring sticking; keystone type rings, which break up any carbon formation; tapered face rings, which give uniform line contact with cylinder face; insert rings; and surface treatments.

No one ring takes care of all conditions, so *application* is a highly important step. Our representatives will be glad to work with you in selecting the ring to solve your problem. Over 30,000 types and dimensions provide rings in every size . . . of every type . . . for every purpose. American Hammered Piston Ring Division, Koppers Company, Inc., Baltimore 3, Md.

TAPERED FACE RING. Seats in rapidly in hardened cylinders. Prevents blow-by.
KEYSTONE RING. Inclined plane action breaks up carbon formation, prevents sticking and blow-by.
STEP SEAL RING. Probably most effective one-piece sealing ring available. Widely used.
CRONIN INNER SEAL RING. Highly efficient in out-of-round or tapered cylinders.
OUTER SEAL RING. Excellent in preventing blow-by in both new or worn cylinders.
T-U RING. Gives a perfect joint seal and a perfect groove seal, permits ring to conform to wall.

**American *Hammered* Piston Rings**

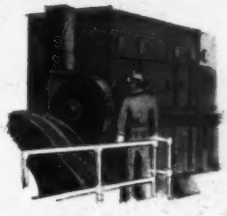
*a* **KOPPERS** *Product*

# Filtrol* Selectivity

**Gives greater diversification •**
**Higher quality •**
**Larger volume at lower cost •**

*Heavy Duty Oils*

*Industrial Oils*



*Diesel Oil*

*Floor Polish*

*Machine Oil*

*Paraffin Wax*

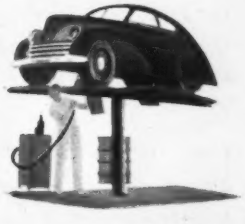
*Additives*

*Aviation Gasoline*

*Synthetic Rubber*

*High Octane Gasoline*

*Aviation Motor Oil*



*Motor Oils*

**FILTROL CORPORATION** • *General Offices:* 634 South Spring Street, Los Angeles 14, Calif. • *Plants:* Vernon, Calif., and Jackson, Miss.

PRODUCT OF Filtrol*

**CATALYSTS AND ADSORBENTS**

RESEARCH AND DEVELOPMENT

# top-notch performance, too

It cost the operator a lot of money to "perch" this Parkersburg Pumper high above the Wichita River in West Texas. But it won't cost much to keep it there!

That's because Parkersburg Pumpers require so little maintenance. Replacements are comparatively negligible throughout the life of the lease. They require minimum man-hours care. That's been proved in field after field where Parkersburg Pumpers have consistently lowered operating costs . . where they have paid back their original cost in down-time savings alone. This over-all record of low operating costs of Parkersburg Pumpers has been proof enough for thousands of operators to decide they can't beat these units for downright economy and dependable pumping.

Years from now, this Parkersburg Pumper will still be atop its tip-top "perch" . . . still giving top-notch performance. Talk over your pumping problems with Parkersburg owners. They'll tell you . . it's not just our opinion . . that Parkersburg Pumpers truly are the best buy for dependable, economical pumping year after year. Your Parkersburg representative will be glad to furnish other details. Parkersburg Pumpers are available for immediate delivery.

**THE PARKERSBURG RIG & REEL CO.**

PARKERSBURG & OCS PRODUCTS
GENERAL OFFICES, PARKERSBURG, W. VA
Plants at Parkersburg, W Va., Coffeyville, Kan
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OCS

# PARKERSBURG

GENERAL ELECTRIC

# Announces...

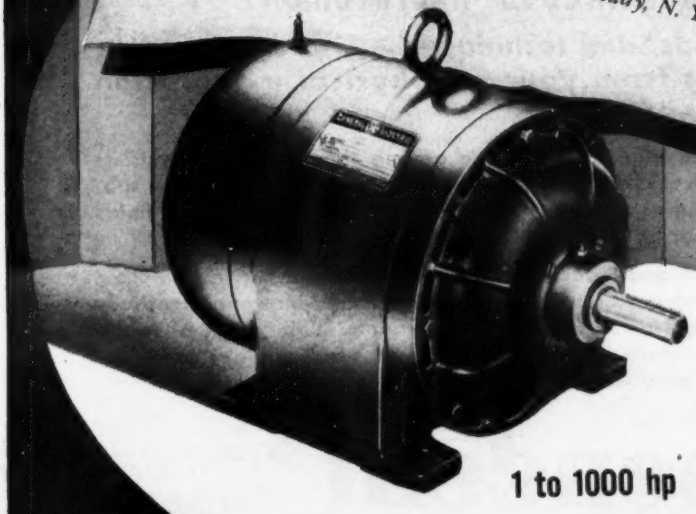
## NEW

### Totally Enclosed TRI-CLAD MOTORS

In 1940, G.E. introduced the Tri-Clad open motor—with emphasis on the feature that industry wanted most in a motor, *protection.* Since then, more Tri-Clads have gone into service than any other integral-horsepower motor.

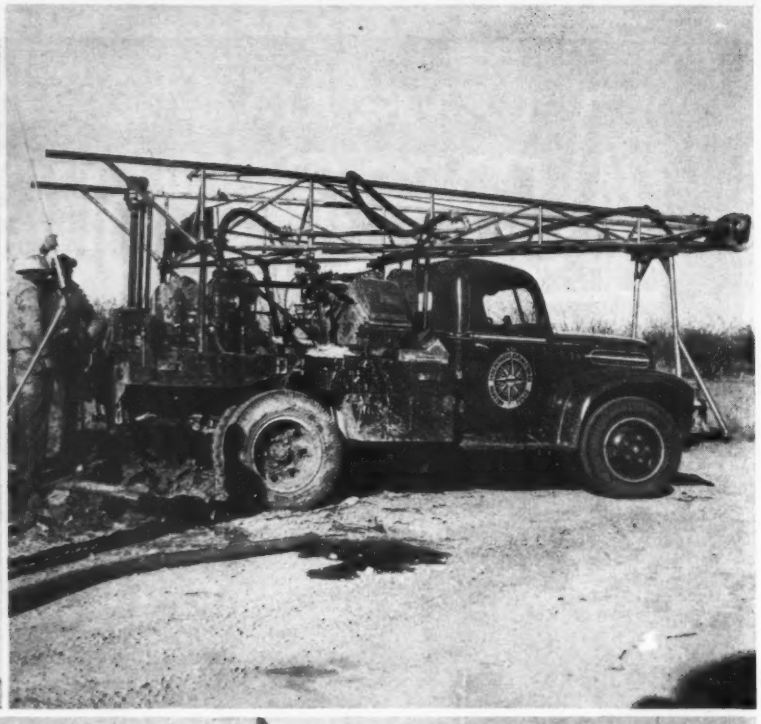
Today, we are ready with a new line of Tri-Clad motors—*totally enclosed, fan-cooled motors*—built on Tri-Clad design principles in both standard and explosion-proof types.

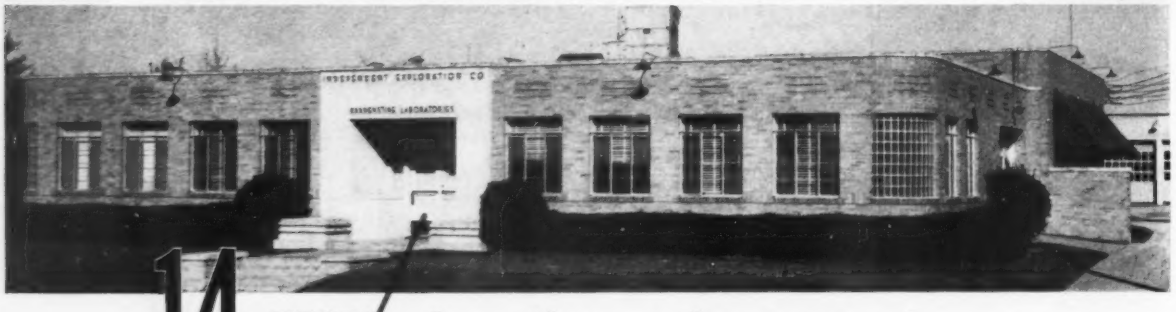
We believe that these are industry's most dependable motors. They are designed specifically for use in many adverse atmospheres—in iron dust, outdoors, in hazardous areas, and chemical atmospheres. Their scope of application is as wide as the field of industrial motor use. Safe-guarded against most sources of motor damage, their longer life and lower maintenance will make them economical motors for use on almost every job. *General Electric Company, Schenectady, N. Y.*



1 to 1000 hp

COMPLETE ENCLOSURE FOR PROTECTION AGAINST DIRT, DUST, AND WEATHER






# 14 YEARS of continuous improvement . . .

***in equipment, methods, and techniques . . . your assurance of profitable results from your geophysical exploration contract with Independent***

**The founders of Independent were among the early geophysicists to make practical use of the reflection seismograph method of subsurface mapping . . . which resulted in the discovery of many fields which would not have been located by other methods.**

**Continuous field and laboratory research has been carried on since 1932 and the advantages of new equipment and improved methods are being passed on to Independent's clients in the form of lower costs, more accurate interpretation, and more complete coverage of possible oil producing areas. Your inquiries are invited.**

IXO

# Independent
## EXPLORATION COMPANY

*Geophysical Surveys*

SEISMOGRAPH
GRAVIMETER
MAGNETOMETER
ESTABLISHED IN 1932

ESPERSON BUILDING HOUSTON, TEXAS

# Name the DRYING SPEED... *Red Lead can meet it*

**Through the years,** Red Lead's effectiveness in fighting rust has won it general acceptance by industry as the standard for metal protection.

**Perhaps less generally known,** however, is that Red Lead's *extra* protection is available in an extensive range of paint formulations to give you the drying speed you need.

**This wide choice** is due to Red Lead's compatibility with the many types of paint vehicles in use today. It can be combined with the new synthetic resins, modified synthetics, natural resins, drying oils and other vehicles.

**So, whether painting schedules** demand quick drying, or whether normal drying time is permitted, remember, you can take full advantage of the plus protection that has made Red Lead famous.

**Why RED LEAD Means Extra Rust Protection**

Red Lead has the property of counteracting acid conditions, recognized as accelerators of rust. In the presence of various acids, Red Lead forms insoluble lead salts at the approximate rate at which the acids are supplied.

**This is true** whether the acid originates from acid-forming environments, such as gas, smoke and moisture in the atmosphere, or from the decomposition of the vehicle. Thus, a rust-inhibiting condition is maintained with a Red Lead paint.

**Red Lead also forms** an adherent protective shield which prevents electro-chemical action, another prime cause of rusting.

**Specify RED LEAD for All Metal Protective Paints**

The value of Red Lead as a rust preventive is most fully realized in a metal paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint.

No matter what price you pay, you'll get a better paint for surface protection of metal, if it contains Red Lead.

**Write for New Booklet**—"*Red Lead in Corrosion Resistant Paints*" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas — ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed below.

**NATIONAL LEAD COMPANY:** New York 6; Buffalo 3; Chicago 80; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W. Va., (Evans Lead Division.)

**Dutch Boy**
*Reg. U.S. Pat. Off.*
**Red Lead**

# JUST TRY TO TAKE A SET KELCO-McEVOY POWER FROM THE MEN ON THE RIG

## A FEW DAYS ON THE RIG AND EVERYBODY FROM THE ROUGHNECK TO THE RIG OWNER . . . IS SOLD

**Toolpushers, drillers, and roughnecks like Kelco-McEvoy Power Slips because:** (1) Heavy back-breaking labor is reduced, increasing crew efficiency and minimizing accidents. (2) Due to a unique linkage which is made integral with a special bowl and a centering ring, pipe is easily guided to bowl and the slips are forced down evenly, assuring a positive grip and protection to pipe. (3) The driller has complete control over slips which gives him complete control of his pipe. The roughnecks have more time to concentrate on handling tongs and spinning lines. There is less chance to drop pipe as it can be caught without danger to roughnecks, due to remote control by the driller

**Drilling Contractors like Kelco-McEvoy Power Slips because:** (1) They play an important part in getting the hole down faster due to safer and more efficient pipe handling. Fishing job time is minimized and the smooth handling of pipe protects the rig equipment all the way down — from the crown block to the bit. (2) They pay for themselves many times over by keeping the bit on bottom longer, by protecting the pipe, by protecting the rig, and by protecting the men.

**Oil Companies like Kelco-McEvoy Power Slips because:** (1) Their use reduces labor turnover, as trained men can remain on the job longer and earn advancement. (2) They are safer. (3) They are more economical.

# OF THESE SLIPS AWAY

*Leading majors, independents, and drilling contractors have conclusively proved that Kelco-McEvoy Power Slips handle pipe with far greater efficiency, economy and safety.*

## CHECK THESE FEATURES

**. . . the outgrowth of years of field and shop testing**

- ✔ *Safety latch* prevents accidental setting. No possibility of snapping string as a result of air line failure.
- ✔ *Mechanism is protected* by the ring against damage by elevators.
- ✔ *Insert-bowl provides unworn seat for slips* assuring perfect alignment and uniform pressure on pipe.
- ✔ *Power unit* — including piston, working surfaces, and packing — is *entirely shielded* at all times from dirt, water, and drilling mud.

**Why not write us NOW for full particulars on these power slips that are creating unusual interest throughout the oil world.**

# McEvoy COMPANY

Maufacturers of:

McEVOY WELL HEAD EQUIPMENT • McEVOY SELF-OPERATING GAS LIFTS

KELCO-McEVOY AIR-OPERATED ROTARY SLIPS

AND NUMEROUS ALLIED OIL INDUSTRY PRODUCTS

**Sold through supply stores everywhere**

**TEXAS AT MILBY**
**P. O. BOX 3127**
**HOUSTON 1, TEXAS**

GRINNELL

PIPING PROGRESS

Steam Header — 18" O.D. x 7/8" wall, 13' 8 3/8" long. Carbon-Moly Turned and Bored Forging with solid, integral end-closure. One 12", three 10" and one 6" outlets.

## Extruded Headers

*Question:* **How can headers be made with smooth inside contours, minimum friction to flow and requiring only plain circumferential butt welds . . . and still comply with Code requirements?**

*Answer:* **By the extruded nozzle process which permits the making of any number of any size outlets.**

Grinnell Extruded Nozzles are made by a patented hydraulic forming process. Outlets can be extruded up to and including full size. Inside contours are smooth, assuring minimum friction to flow. Welding ends are machined to same wall thickness as abutting pipe. Only circumferential butt welds are required.

WHENEVER **PIPING** IS INVOLVED

Typical of Grinnell's advanced pipe fabrication facilities is this forming process for outlets in headers which simplifies erection of piping on the job by elminating difficult intersection type welds. They are made possible by this company's 95 years of piping experience and continuous laboratory research and experimentation.

Whenever piping is involved—Grinnell has the specialized knowledge, field engineering experience and the production facilities to handle the job from first plan to actual operation. From this one source you can get everything from a tiny tube fitting to a complete power or process piping installation.

GRINNELL COMPANY, INC., Executive Offices, Providence 1, R. I. Branch warehouses in principal cities. Manufacturing Plants: Providence, R. I.; Cranston, R. I.; Atlanta, Ga.; Warren, Ohio; Columbia, Pa.

GRINNELL

FOUNDED 1850

WHENEVER **PIPING** IS INVOLVED

# The "Standout" Name in BOLTED STEEL TANK Design and Constuction!

# COLUMBIAN

**Throughout the world-wide oil industry the name "COLUMBIAN" stands out as the tested and proved guide to the finest in bolted steel storage tanks. For more than 50 years oil producers everywhere have known it as a name to be relied upon for bolted steel tanks that are precision engineered and quality built from top grade steel.**

**Columbian stairways and walkways are of the suspension bracket type and are adaptable for all tank installations. No ground supports are needed in standard construction, and brackets are adjustable for tanks on different levels. Special designs, as illustrated above, to customer specifications.**

**Columbian Bolted Steel Tanks are available now for oil producers. Columbian COP-NIC Tanks, especially for sour crude, will be available as conditions permit.**

**Columbian ALL METAL Buildings**

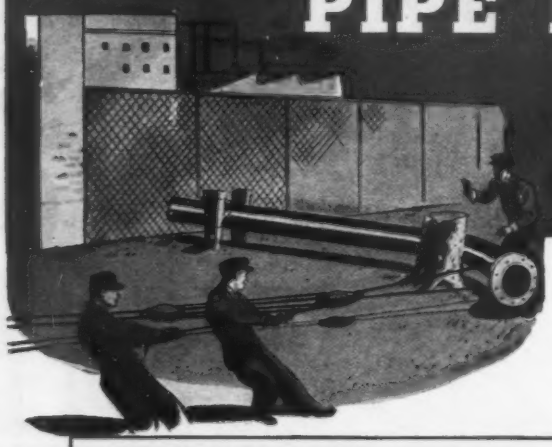
Columbian All-Metal buildings of sectional panel construction are highly popular in the oil industry for warehouses, engineers' offices, garages, equipment and storage houses. No other type of construction so satisfactorily meets the needs of both permanent and portable buildings. Low-upkeep—rigid, strong and durable. Write for complete information.

**COLUMBIAN STEEL TANK CO.** Kansas City, Mo.

COLUMBIAN STEEL TANK COMPANY — TANKS FOR THE WORLD — KANSAS CITY, MO. U.S.A.

COLUMBIAN STEEL TANK CO. K.C. MO. — COP-NIC — A COPPER NICKEL ALLOY — TANKS FOR THE WORLD

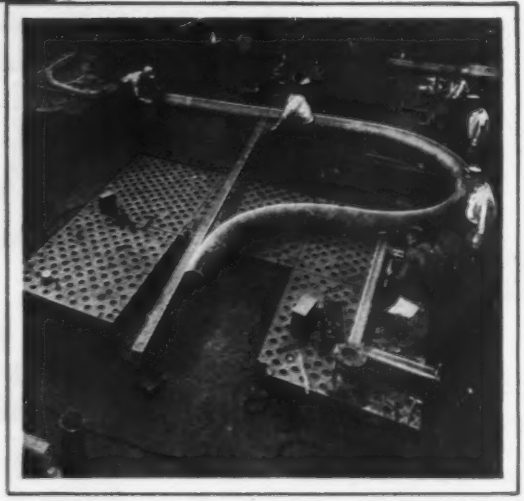
# PIPE FABRICATION
## *Is Not a "Back Yard" Job*



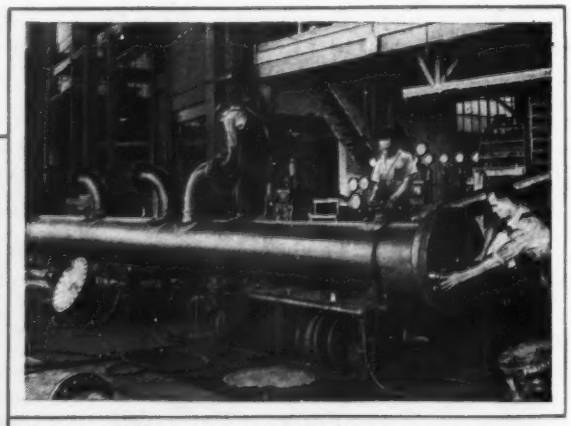
If pipe fabrication looks like an easy skill which can be picked up and practiced at odd times in the back yard, consider these facts: Qualified pipe fabricators report that it takes years to train skilled mechanics such as pipe benders . . . and years to develop competent piping layout men.

Expensive equipment is needed if a job is to be done satisfactorily and economically . . . layout tables . . . bending equipment . . . Van Stone machines . . . rotating fixtures and jigs for welding . . . furnaces for heat treating and stress relieving . . . machine tools . . . testing equipment . . . etc. A subassembly which looks relatively simple may require the use of equipment representing a very large investment.

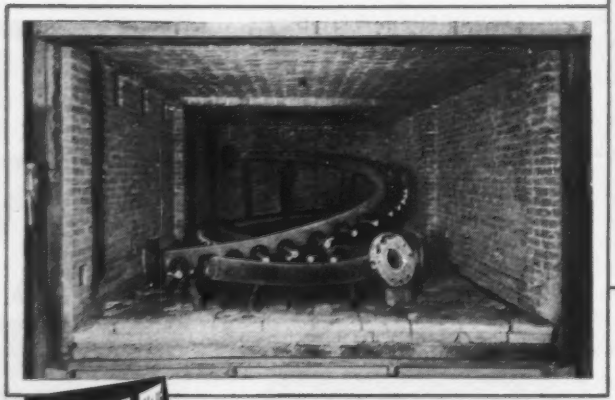
Pipe fabrication is not a back yard job—it is a difficult art which requires skill, special training, experience, and plenty of equipment. Qualified pipe fabricators have the well-equipped shops staffed with the highly skilled men necessary to meet today's exacting pressure piping requirements.



*Layout and squaring tables used by qualified fabricators for more accurate piping.*



*Testing in the shop of the qualified pipe fabricator saves time in the field.*



*Furnace for heat treating alloy piping and stress relieving shop- welded subassemblies.*

P.F.I. THE PIPE FABRICATION INSTITUTE

**THE PIPE FABRICATION INSTITUTE**

*Devoted to the Technical and Economic Problems in Piping*

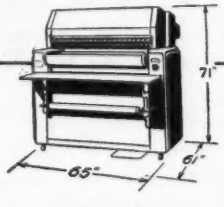
1108 CLARK BUILDING • PITTSBURGH, PA.

F-6

# ARE THESE *YOUR* QUESTIONS ABOUT DIRECT PROCESS BLACK LINE PRINTS?

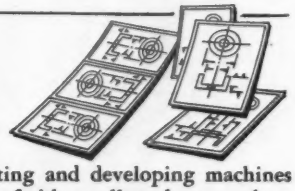
***Will I need specially trained operators to make BW black line prints?***

No—any intelligent person can quickly learn to make Bruning BW Prints, with their black lines on white backgrounds. Remember, too, that even the high volume Bruning printer-developers require only *one* operator. All Bruning equipment is designed for ease of use. Operation is exceptionally simple—no complicated gadgets to confuse operator.




***How much space will I need to install BW equipment?***

Because it is so compact in construction, BW printing and developing equipment can be installed in a corner of your drafting room or engineering department, or in a private office. The Bruning printer-developer shown above—largest of many Bruning BW machines—measures only 65" wide, 61" deep and 71" high. Bruning equipment requires no plumbing—no provision for exhaust fumes, because there are none.



***Can I have cut sheet and roll stock production, too?***

Yes—Bruning BW printing and developing machines offer you the advantages of either roll stock or cut sheet production. When cut sheets are used, Bruning provides sheets of BW sensitized paper cut to the exact size of your tracings—thus saving trimming time and waste. The Bruning line of equipment is complete—providing exactly the right equipment for your needs.

**You Get These Six Major Advantages with the BRUNING BW SYSTEM**

1. A versatile, simple method for making black line or colored line prints directly from tracings.
2. 17 years' experience in analyzing printmaking needs.
3. A complete line of materials, including white and green-tinted papers, thin, medium and card-weight papers, black, red or brown line prints, BW Transparents to supplement original tracings and BW Film for intensifying pencil lines in reproduction.
4. A complete line of printing and developing machines to fit every requirement.
5. A continuing service . . . because Bruning sells every*thing* for the engineer and draftsman, not just BW equipment. Buying a BW machine is, therefore, not a "one time sale."
6. Continuing research and development in the customer's interest.

**CHARLES BRUNING COMPANY, INC.**

*Since 1897*

| NEW YORK | CHICAGO | LOS ANGELES | |
|---|---|---|---|
| Atlanta | Boston | Detroit | Houston |
| Kansas City | Milwaukee | Newark | Pittsburgh |
| St. Louis | San Francisco | Seattle | |

CHARLES BRUNING COMPANY, INC.
4732-38 Montrose Avenue, Chicago 41, Illinois

Gentlemen: I want to know more about Bruning BW Prints and equipment. Please send me information.

*Name*.....

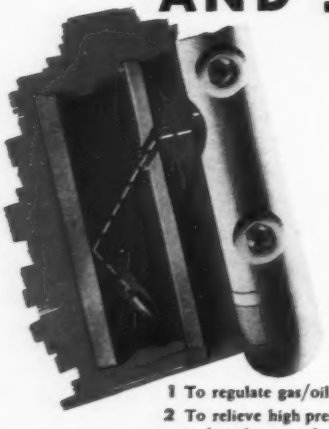
*Company*.....

*Street*.....

*City*..... *State*.....

*It's a good trick*

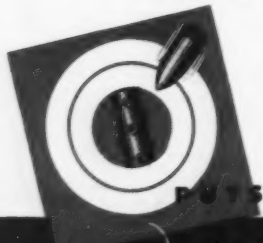
## AND McCullough DOES IT with the BULLET THAT TURNS A CORNER



Punching a clean hole through tubing or drill-pipe, without damaging the casing around it; sounds as impossible as firing a gun in a closed room without hitting anything. But McCullough does it as a matter of course with the *exclusive* McCullough Deflecting Bullet—the bullet that literally turns corners.

The tremendous value of this regular McCullough service—used by many major operators—has been shown in hundreds of jobs. A few examples:

1 To regulate gas/oil ratios.
2 To relieve high pressure above a packer, so tubing and packers can be removed safely.
3 To establish circulation above packers and tubing hangers.
4 To establish circulation to free stuck drill pipe or plugged bit.
5 To free stuck pipe by washing away mud and sand.
6 To recover production above a packer—and various other applications.
7 To clear muck from around pipe so it can be backed off close to drill collar.
8 To establish circulation to kill high pressure wells, permitting resumption of work on well.



**Just one more service to prove that under ANY conditions**

# McCullough

**PUTS THE SHOTS WHERE THEY COUNT!**

**22 SERVICE LOCATIONS**

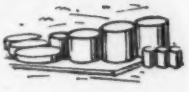
McCULLOUGH TOOL COMPANY . . . 5820 S. Alameda St., Los Angeles 11, California
Export Office: 30 Rockefeller Plaza, New York 20, N. Y.

**TEXAS:** ALICE, CORPUS CHRISTI, HOUSTON, McALLEN, ODESSA, TYLER, VICTORIA, WICHITA FALLS
**OKLAHOMA:** GUYMON, OKLAHOMA CITY **MISSISSIPPI:** LAUREL **NEW MEXICO:** HOBBS
**CALIFORNIA:** AVENAL, BAKERSFIELD, LOS ANGELES, SACRAMENTO, VENTURA **WYOMING:** CASPER
**LOUISIANA:** HOUMA, LAKE CHARLES, NEW IBERIA, SHREVEPORT

# WHEN

***PURGING GAS REQUIREMENTS FLUCTUATE***

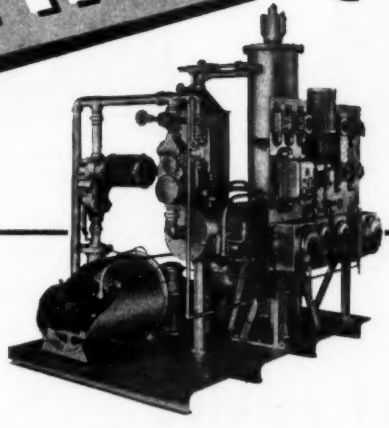
***BLANKETING COSTS ARE TOO HIGH***



***PIPING NEEDS FLUSHING BEFORE REPAIR***

# THEN

## a KEMP "inert gas unit" will earn its keep—plus!



**AT PORT ARTHUR, ON LUBE OIL**

. . . this 3,000 cu. ft. per hr. KEMP "inert gas" unit supplies purging gas for both stills and piping—at the same high efficiency whether operating at 20% or 100% capacity. Explosion proof motors, automatic combustion control, rugged design, and flame protection, are special features. Gas analysis: $N_2$–87%, $CO_2$–12.5%, $CO+H_2+CH_4$–0.5%, $H_2O$–saturated at aftercooler discharge temperature.

And the reason is that brand of engineering which respects the conditions of use.

First, a KEMP "inert gas generator" is just as efficient at partial load as at full capacity. That's because turbo-blowers, rather than positive-displacement blowers, are used. At half delivery only half power is needed by the motors.

Second, the combustion chamber is so generous, and fuel-air carburetion so exact, that you're sure of complete combustion--and zero oxygen.

Third, operation is completely automatic, and safeguarded against both utility failure and flame extinction. Anybody can run a KEMP unit. And the maintenance man's life is made easy because the system is simple and gadget-free. You can get at any part (including the ignitor gap) without rebuilding the job.

The net result is "inerts" for purging and blanketing at 15¢ per M cu. ft. (including amortization)—"inerts" you can afford to pipe all over the refinery to use whenever and wherever you wish.

**KEMP OF BALTIMORE**

PRECISION CARBURETION + ADAPTED COMBUSTION FOR INDUSTRY'S HEAT-USING PROCESSES
ATMOSPHERE GENERATION & ADSORPTIVE DRYER SYSTEMS FOR PROCESS CONTROL AND PROTECTION

Dept. K-Glog
The C. M. Kemp Mfg. Co.
405 E. Oliver Street, Baltimore 2, Md.

Put me on the mailing list for that new engineering literature you're working up this summer. ☐
I'd like to talk about my particular situation; get in touch with me soon. ☐

NAME.....
POSITION.....
COMPANY.....
PLACE.....

**See Your LUNKENHEIMER DISTRIBUTOR for Needed Parts . . . Better Valve Service!**

Lunkenheimer Distributors are located in principal industrial centers. They are important links in the Lunkenheimer chain of better, more efficient valve service—service that can save you time, trouble, and money. Our Distributor nearest you can supply you with Lunkenheimer precision-made, perfect-fitting parts, and will gladly help you solve problems of valve maintenance or operations.

**He's interested in...**

**TEN THOUSANDTHS OF AN INCH**

If parts do not measure up to the stringent requirements for accuracy, they never enter a Lunkenheimer Valve and never become part of a Lunkenheimer Distributor's stock.

# . . . require fewer replacements
# . . . cost less per year of service

In every respect—quality of materials, advanced design, finest precision workmanship—Lunkenheimer Valves are built to provide *longer* as well as more efficient and reliable service.

One or two new parts at long intervals make a correctly engineered, ruggedly constructed Lunkenheimer Valve as good as new. All Lunkenheimer parts are precision-made . . . perfectly matched . . . *requiring no special fitting on the job.*

Thus, when you install Lunkenheimer Valves you can look forward to purchasing fewer replacement valves . . . and to easier, lower-cost replacement of present valves with parts quickly obtainable from your nearest Lunkenheimer Distributor.

Remember—in utmost economy plus superior efficiency, Lunkenheimer products offer you *greater value per valve dollar.*

THE LUNKENHEIMER COMPANY

CINCINNATI 14, OHIO, U. S. A.

NEW YORK 13, CHICAGO 6, BOSTON 10, PHILADELPHIA 7.

EXPORT DEPARTMENT: 319-322 HUDSON ST., NEW YORK 13, N. Y.

**BRONZE, IRON, STEEL, AND CORROSION-RESISTANT ALLOY VALVES, 125 TO 2500 LB. S. P.**

**BOILER MOUNTINGS AIR CONTROL DEVICES LUBRICATING DEVICES AIRCRAFT FITTINGS**

# THEY'RE ALL WINNERS!

They're "champions," these three Fairbanks-Morse units for the petroleum industry . . . winners in dependability and efficiency, winners in economical operation and maintenance. Put them to work for you, and you'll soon be profiting from their superior performance.

**ZC ENGINES** You'll appreciate the economies found in Fairbanks-Morse ZC engines. Simple in design, they operate unattended, running smoothly day after day despite severe weather, consuming a minimum of fuel and lubricating oil. Almost any fieldman can service them quickly and easily.

**MOTORS** Whatever types and sizes of motors you need, you'll find them at their best in the complete Fairbanks-Morse line. The general-purpose motor shown is far ahead in stamina, protection, and versatility. It is the only motor with a rotor centrifugally cast in one piece . . . and of copper.

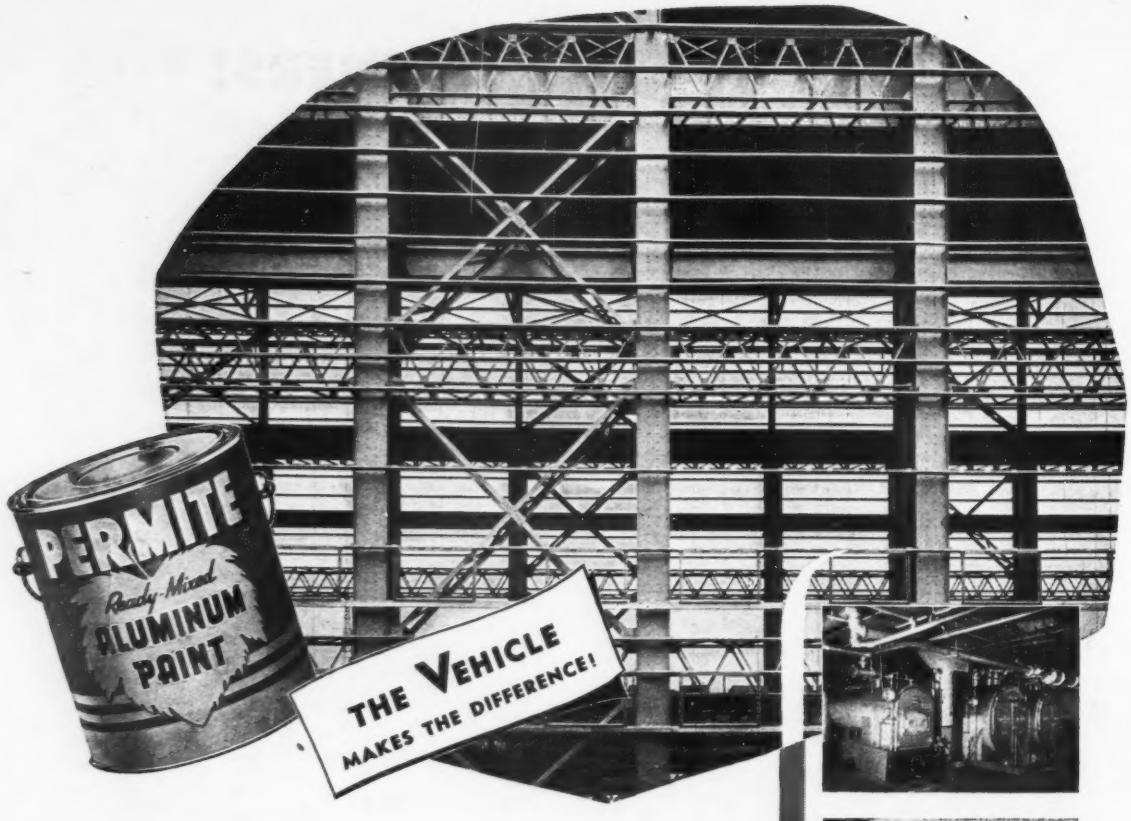
**PUMPS** Fairbanks-Morse Pumps are available for every type of liquid, for capacities up to 50,000 g.p.m., and for pumping against low, moderate, medium, or high heads. Only Fairbanks-Morse offers a complete line of pumps with pump, driver, coupling, and base all designed, built, guaranteed, and serviced by one manufacturer.

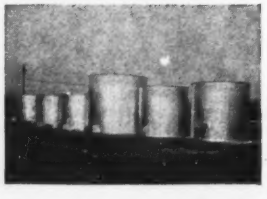
Fairbanks, Morse & Co., Chicago 5, Illinois

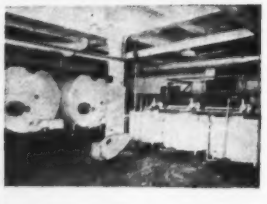
# Fairbanks-Morse

*A name worth remembering*

Oil Field Equipment • Diesel Locomotives
Diesel Engines • Generators • Motors • Pumps
Scales • Magnetos • Stokers • Railroad
Motor Cars and Standpipes • Farm Equipment







## The **RIGHT** Paint . . .

## FOR THE PARTICULAR JOB TO BE DONE!

MEN who know paints best like Permite Ready-Mixed Aluminum Paints best. They know there is a specially formulated Permite Paint for each surface condition. They like Permite's **immediate readiness for use.** No mixing – they simply open the can and go to work. And they know there is a very special reason for this time-saving quality.

Permite Paints are made of an **exclusive vehicle,** processed from synthetic resins and specially adapted oils, and a 99+% pure aluminum pigment. Precise blending of pigment and vehicle perfectly stabilizes Permite Paints – maintains them always in velvet-smooth solution.

The result on any kind or condition of surface is better multiple leafing, more enduring armor-like protection against moisture, smoke, fumes and the extremes of heat and cold.

Permite chemists and engineers work in America's only plant designed exclusively for aluminum paint making. They devote their skills to producing better paints, the kind that expert painters prefer. See your distributor or write us for information.

**ALUMINUM INDUSTRIES, Inc., CINCINNATI 25, OHIO** ***Distributors in Principal Cities***

# PERMITE READY MIXED ALUMINUM PAINTS

# Like a *Paid-up* INSURANCE POLICY

## GUIBERSON Tubing Catchers give Life-Time Well Protection

A one-time investment for a life-time protection, Guiberson tubing catchers protect your well equipment—eliminate expensive fishing jobs that result from tubing drop due to corrosion, joint failure or accidents. Designed for positive, instantaneous action, the Guiberson Tubing Catcher positively will not let tubing get away—it stops dropping tubing before it falls three inches. On guard 24 hours a day, the Guiberson Tubing Catcher is safe and sure—it is well insurance that lives up to the Guiberson slogan "Better be safe than Sorry."

Short and compact in design, the Guiberson Tubing Catcher has full-sized opening through the seamless steel tube and largest fluid and gas by-pass around the Catcher. Made for every depth well and for every casing size, Type "E" is recommended for tubing strings up to 11,000 feet of 2" tubing. For deeper wells, use two Type "E's" or the Type "F". Anchors can be provided on both types.

**TYPE "E" TUBING CATCHER**
Three slips of heat-treated alloy steel; backed in all positions by precision-machined head.

**TYPE "F" TUBING CATCHER**
For extremely deep wells; six type "B" slips deliver double-duty slip area.

*Guiberson* U.S.A.

**THE GUIBERSON CORPORATION**

DALLAS, TEXAS — ESTABLISHED 1919

SAFE THAN SORRY BETTER BE GUIBERSON

Reg. U. S. Pat. Off.

*California Distributor:* THE W. R. GUIBERSON CO., 717 East Gage Avenue, Los Angeles, California.
*Export Representative:* OILFIELD-INDUSTRIAL EXPORT, INC., 30 Rockefeller Plaza, New York, New York.
*Branch Offices in* Oklahoma City, Oklahoma; Longview, Texas; Kilgore Texas; Houston, Texas; Alice, Texas; Odessa, Texas; Evergreen, Colorado; Lafayette, Louisiana; Newark, Ohio.

# high-lift cuts your pressure losses!

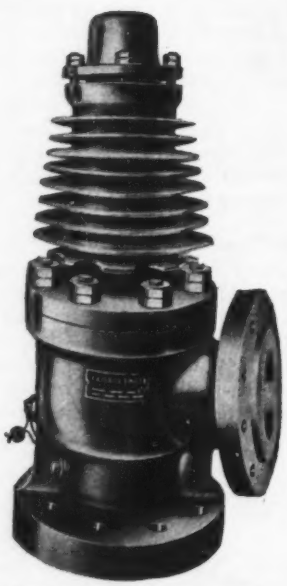
**Specify FARRIS "high-lift" valves for non-shock relief of over-pressures. You're done with slow sputtering pop actions . . . costly losses of working pressure . . . when you specify FARRIS! The high-lift action of the FARRIS relief valve-design delivers high-capacity discharge — for quick relief of over-pressure.**

***How does FARRIS get this high-lift action? 4 ways:***

1. *The unique disc-design gains extra lift from the high-velocity port discharge.*
2. *Single blowdown ring does not affect capacity.*
3. *The long, low-stressed springs are custom-rated.*
4. *Friction lag is held to a minimum by centralized guiding of the springs and precision alignment.*

**The new FARRIS Catalog tells you which "high-lift" valve you need to lower excessive pressure-losses in your pressure lines — *to lift your operating efficiency!***

**Write today for new FARRIS catalog!**

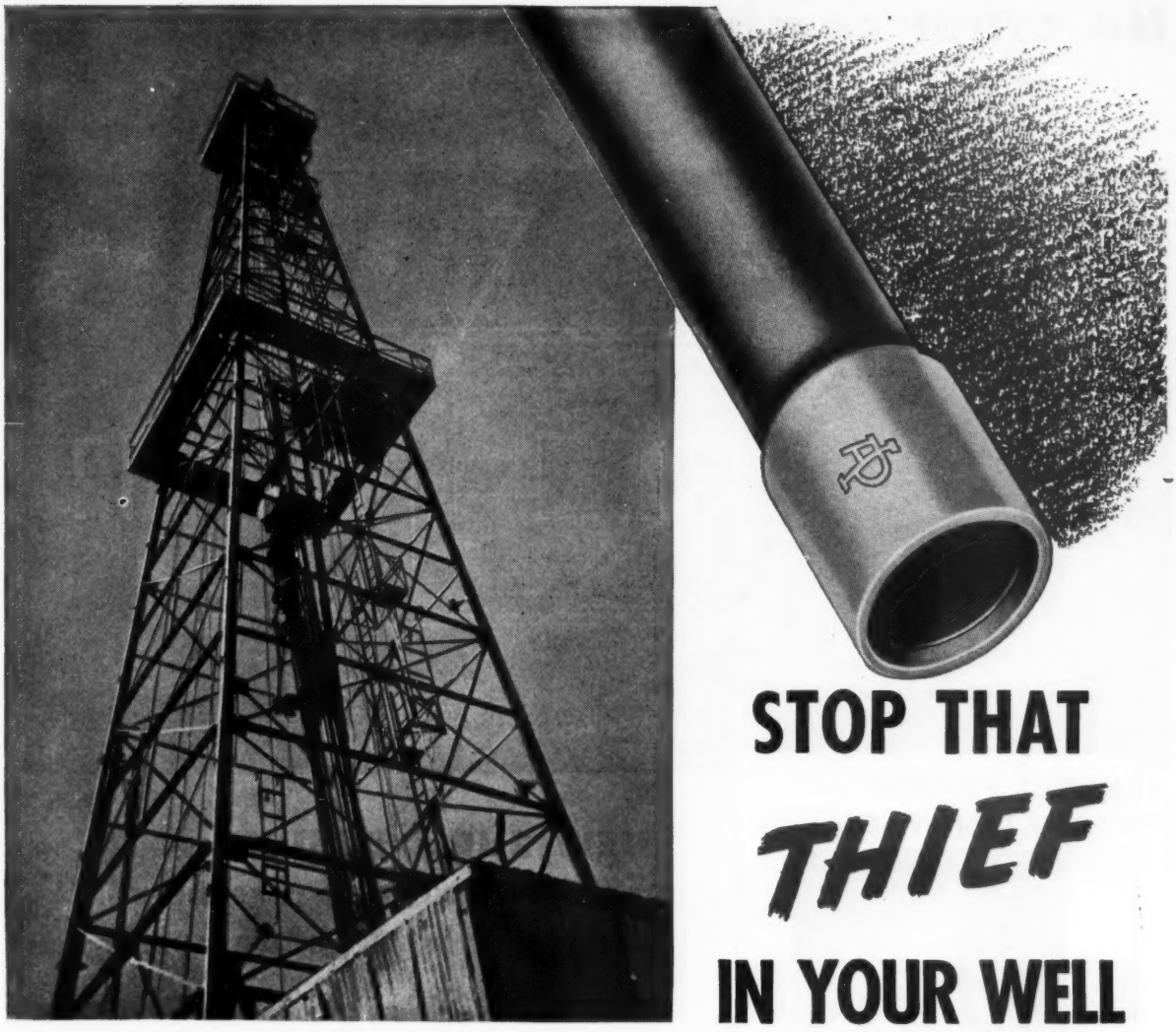


*FARRIS high-lift Venturi Port. Type 1650, high-pressure, high-temperature Safety Relief Valve. Sizes 1½" to 4", pressures up to 900 lbs. — 1000°F.*

Farris **SAFETY AND RELIEF VALVES**

FARRIS ENGINEERING COMPANY
372 Commercial Ave., Palisades Park, N. J. FE-521

***FARRIS keeps pace with advancing power and process engineering***



# STOP THAT *THIEF* IN YOUR WELL

In every well, severe pressures lurk like a sly thief—seeking weak casing—ready to crush it—ready to steal hundreds of hours of production.

You can stop this thief by insisting that your strings be made up with Republic Electric Weld Casing.

Produced by Republic's improved welding process, the weld is as strong as the wall. Normalizing, cold forming and sizing give Republic Casing extra strength and ability to resist tremendous external pressures.

Because it is made from flat-rolled steel, Republic Casing is uniform in wall thickness, size, roundness and concentricity. These qualities assure accurate threads with added pull-out strength, because the maximum amount of steel is left under the thread roots at all points on the circumference.

Be sure you get every one of these money-saving advantages, by specifying Republic Electric Weld Tubing and Casing.

**REPUBLIC STEEL CORPORATION**
**GENERAL OFFICES • • CLEVELAND 1, OHIO**
Export Department: Chrysler Building, New York 17, N. Y.

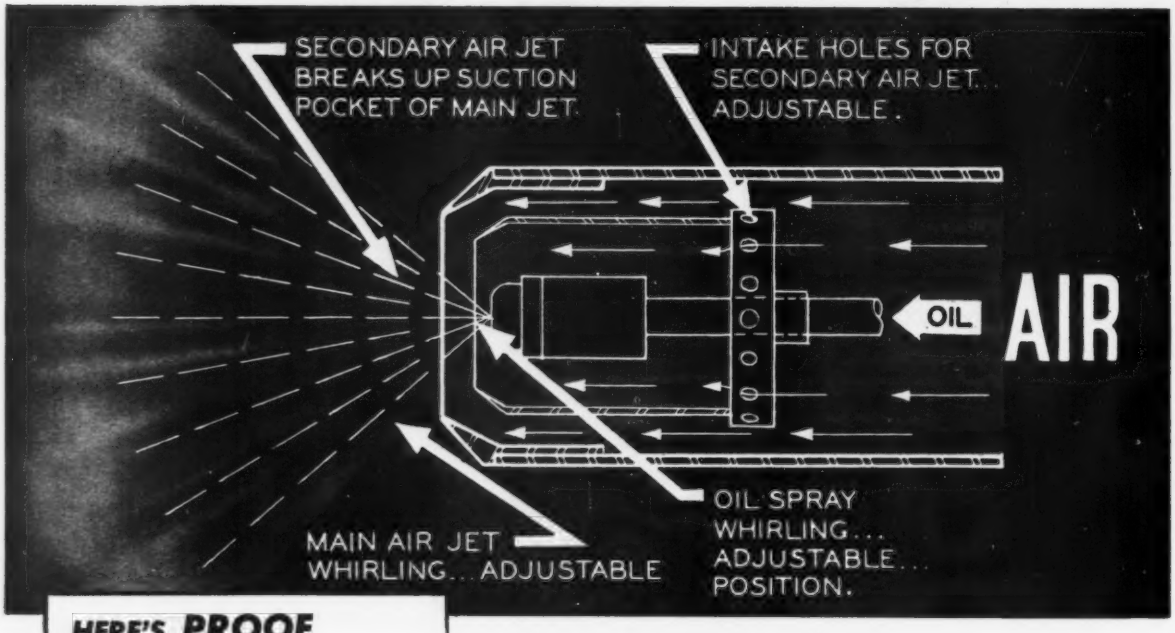
**INSPECTED INSIDE AND OUT**

Republic Electric Weld Casing and Tubing are made from flat-rolled steel, both sides of which can be inspected. Thus, the surface which becomes the inside wall is free from hidden defects.

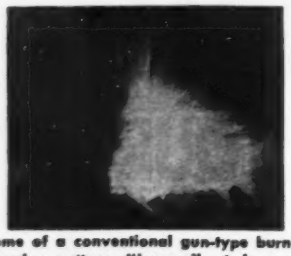
**REPUBLIC** *Electric Weld*
**LINE PIPE**
**NORMALIZED CASING AND TUBING**

Other Republic Products include Alloy Steels—U[illegible]

# No other combustion head has ALL THESE FEATURES!


SECONDARY AIR JET BREAKS UP SUCTION POCKET OF MAIN JET.
INTAKE HOLES FOR SECONDARY AIR JET. ADJUSTABLE.
OIL
AIR
OIL SPRAY WHIRLING... ADJUSTABLE... POSITION.
MAIN AIR JET WHIRLING... ADJUSTABLE

## HERE'S PROOF OF DESIGN BENEFITS!



**Flame of a conventional gun-type burner. Irregular pattern, "bumpy" at low oil-consumption rates. Excess-air percentage is necessarily high.**

**Flame of the Shell combustion head. Steady, controllable pattern. Complete combustion with but a negligible amount of excess air.**

## NEW SHELL DESIGN offers manufacturers new economy in their domestic oil burners

A SIMPLE physical phenomenon—the fact that a low pressure area exists in the center of an air jet—has plagued oil burner manufacturers for years. This low pressure area, unless controlled, acts as an erratic pull against the flame. It is one reason for "bumpy," noisy burning.

Shell research scientists, in seeking more efficient burner operation, have perfected a new combustion head which not only eliminates the erratic suction-pocket effect, but provides a more intimate mixture of air and fuel and *better control of that mixture.* By maintaining uniformly high air velocities, even with low oil rates, this design assures burner manufacturers smokeless combustion with up to 14.5% $CO_2$—performance considered excellent even for large industrial installations.

**Licensing Arrangement**—Shell does not manufacture this patented combustion head, but does make the design available to oil burner manufacturers under license. Write for details.

SHELL

**SHELL DEVELOPMENT COMPANY, INCORPORATED**

50 West 50th Street, New York 20, N. Y.

A MODERN . . . AND PROVED . . . PROTECTION AGAINST CORROSION

● You can . . . on numerous installations throughout your plant . . . with Fedelco Liquid Plastic Coating. It's a remarkable surfacing material composed of the most inert thermoplastic resins, designed to effectively combat corrosion year after year under the toughest conditions.

Developed by Fedelco Engineers in 1939 especially to meet the challenge of corrosion, the amazing features of Fedelco Liquid Plastic Coating . . . resistance to mineral acids and alkalies or their salts, dielectric qualities, opposition to vapor permeability and non-contaminating features . . . provide practically permanent protection from corrosion.

Fedelco Liquid Plastic Coating is unaffected by the sun's rays. It is tough . . . yet flexible enough to contract and expand under cold and heat without cracking. It is abrasion resistant. It will not chip. It will not ignite when thoroughly dry.

Fedelco Liquid Plastic Coating adheres to metal, wood or concrete. Surfaces require minimum cleaning. Just remove surface greases and scale. Impermeability of the coating is completed . . . through evaporation of solvents . . . in the presence of heat, air and moisture.

In developing this remarkable new corrosion-prevention coating, Fedelco Engineers have made a thorough study of your corrosion problems. Let them discuss it with you. They can quickly explain how completely . . . how easily . . . how economically your corrosion problems can be solved with Fedelco Liquid Plastic Coating. It's not a "substitute" for paint. It's a modern and proved protection against corrosion.

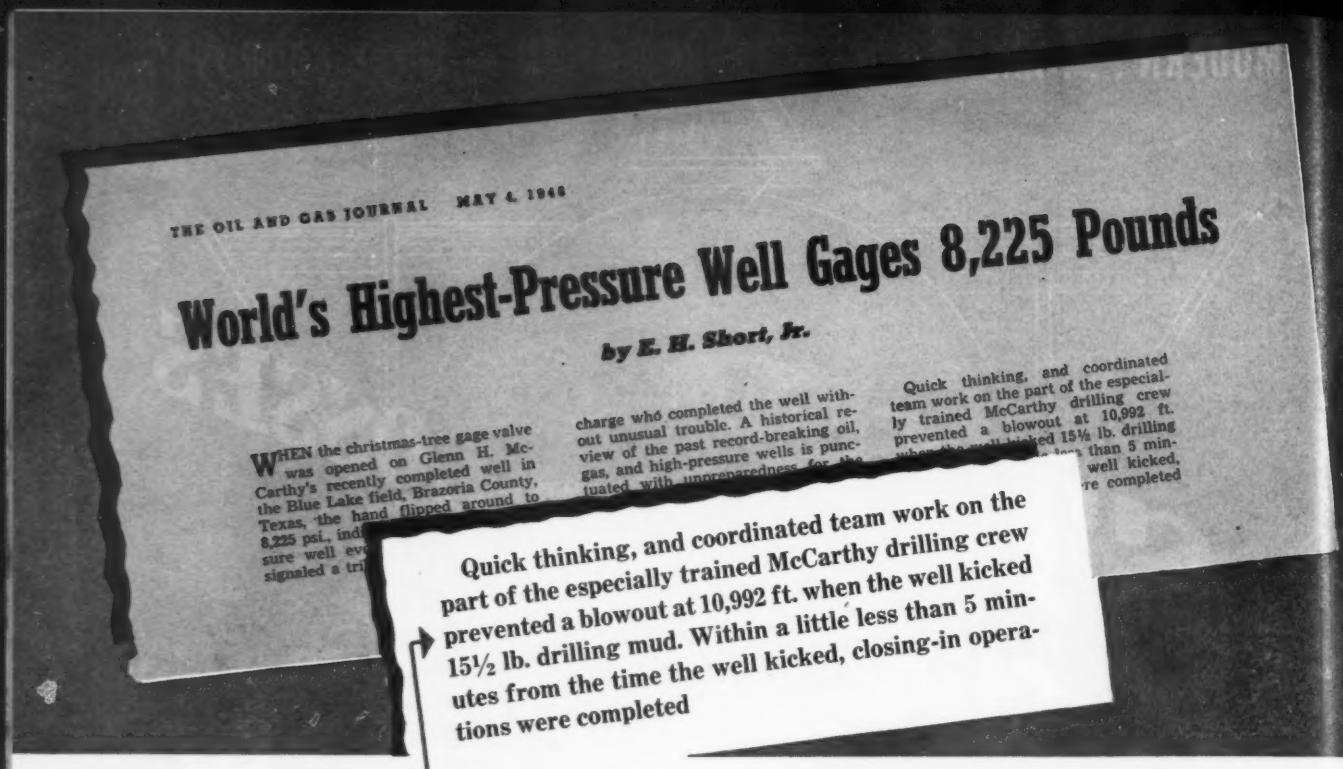
Setting The Pace
In Plastic Coating
To Conquer
Petroleum Corrosion

**FEDERAL ELECTRIC COMPANY Inc.**

PLASTIC DIVISION

225 North Michigan Avenue CHICAGO, ILL. 914 South Wabash

405 Velasco Street HOUSTON, TEXAS
2114 Main Street DALLAS, TEXAS
JENNINGS, LA.
310 Thompson Bldg. TULSA, OKLA.
730 St. Charles Street NEW ORLEANS, LA.



THE OIL AND GAS JOURNAL MAY 4, 1946

# World's Highest-Pressure Well Gages 8,225 Pounds

by E. H. Short, Jr.

WHEN the christmas-tree gage valve was opened on Glenn H. McCarthy's recently completed well in the Blue Lake field, Brazoria County, Texas, the hand flipped around to 8,225 psi., ind... sure well ev... signaled a tri...

charge who completed the well without unusual trouble. A historical review of the past record-breaking oil, gas, and high-pressure wells is punctuated with unpreparedness for the...

Quick thinking, and coordinated team work on the part of the especially trained McCarthy drilling crew prevented a blowout at 10,992 ft. when the well kicked 15½ lb. drilling mud. Within a little less than 5 minutes from the time the well kicked, closing-in operations were completed

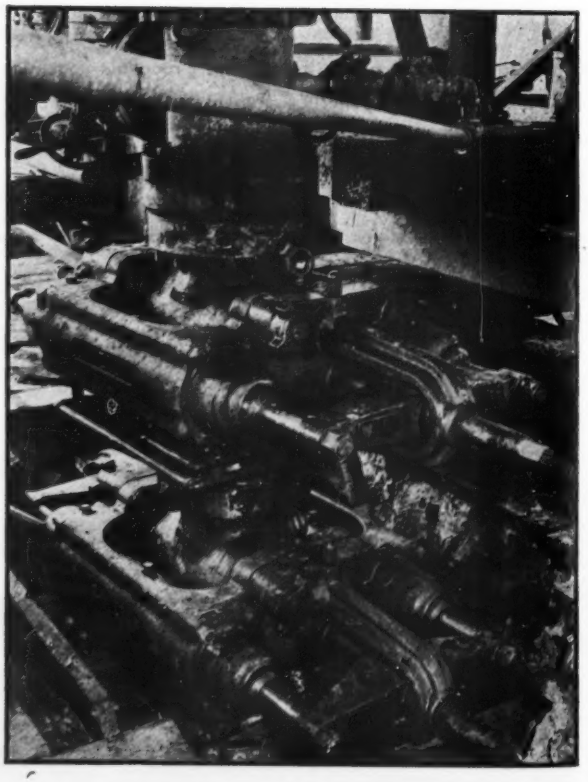
**Quick thinking, and coordinated team work on the part of the especially trained McCarthy drilling crew prevented a blowout at 10,992 ft. when the well kicked 15½ lb. drilling mud. Within a little less than 5 minutes from the time the well kicked, closing-in operations were completed**

# PLUS CAMERON

## pressure-operated drilling control units!

Because of the extremely high pressures usually encountered in drilling today's deep wells and considering the tremendous investment in well bore and machinery required to drill a 10,000-12,000 foot hole, it is sound economy to replace obsolete drilling control units with Cameron Type "QRC" Pressure-Operated Blowout Preventers. For here is the industry's most dependable safeguard against loss of control. It closes swiftly, requiring only 1000 pounds closing pressure to seal against 8000 pounds well pressure. Its rams can be changed in a matter of minutes. Patented self-feeding ram packing which has made Cameron blowout preventers famous the world over is a feature of the new unit. Six inch and ten inch sizes are available in both 6000 and 10,000 pound test pressure models. These and many other mechanical improvements are embodied in the "QRC" design.

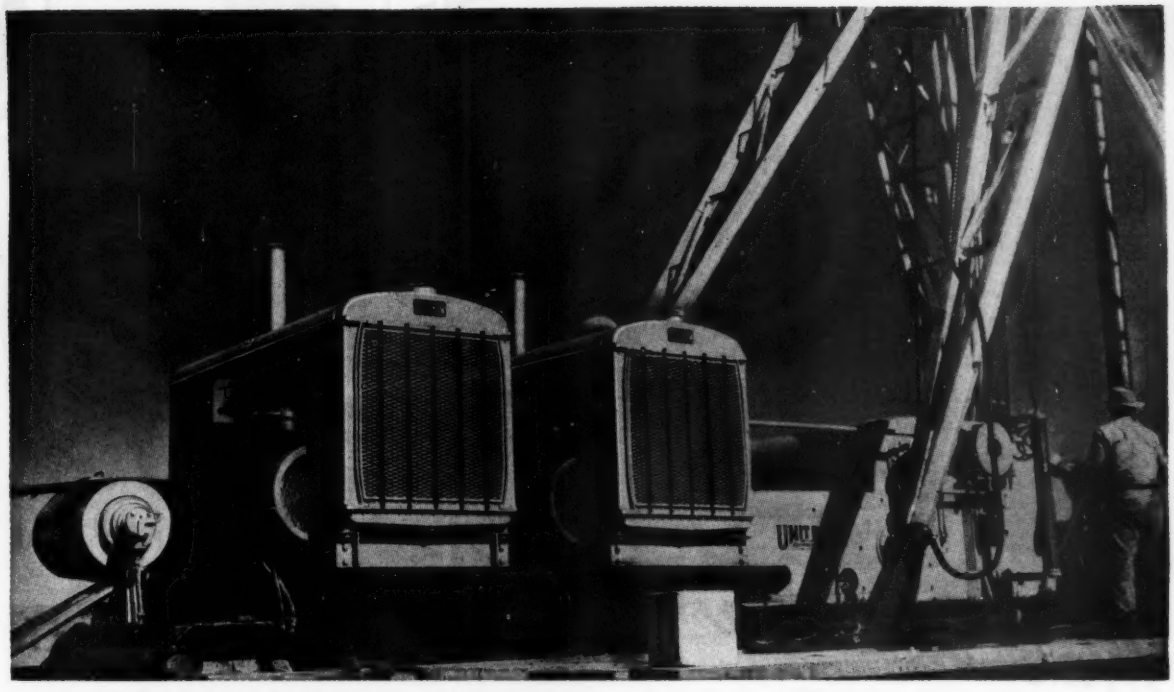
Complete details will gladly be sent to interested operators on request.



**CAMERON IRON WORKS, INC.**

711 MILBY ST., HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y. Oklahoma: 310 Thompson Bldg., Tulsa. California: H. G. (Jeff) Musolf, Los Angeles (Kimball 1281), Long Beach (6-68387).



The W. D. Kelly Drilling Company, of Pampa, Texas, owns this Model U-10 UNIT Rotary Drilling Rig, powered by two MURPHY DIESEL Model ME-66, 6 x 6½", 6-cylinder full Diesels, compounded for 300 HP continuous, 360 HP intermittent.

# KELLY PUTS DEPENDABLE MURPHYs TO WORK

EVER-INCREASING endorsements of the advantages of MURPHY DIESEL power units in oil field operations continue to emphasize the dependability of these full Diesel engines wherever drilling, pipe-line and producing-work calls for unfailing power. That smooth, flexible performance that MURPHY DIESELS provide, is winning the O K. of many successful operators.

MURPHY DIESEL performance indicates these are engines that will keep up their good work and be prominent in future oil field projects . . . for they have proved themselves economical in operation and maintenance, rugged and long-lived, able to stay on the job "through thick and thin"... and they are compact and relatively light enough in weight to be adaptable to either portable equipment or stationary installations. There are other reasons, too . . . write for bulletin.

FIELD-PROVEN *Power*..

More Power MURPHY DIESEL More Profit

228

**MURPHY DIESEL COMPANY**

*Engines from 90 to 215 H.P. Generator Sets from 60 to 115 K.W.*

5305 W. BURNHAM ST., MILWAUKEE 14, WIS. *TULSA BRANCH:* 416 S DETROIT AVE., TULSA 3, OKLA.

Make sure it's a
TIGHT JOINT!
● One joint failure could cost your company many dollars in lost production and fishing time.
The basic factors involved in making tight joints are (1) proper machining and threading and (2) proper joint make-up in the field.
The threads of Jones Sucker Rods are made uniformly accurate on automatic threading machines.
Jones' persistent educational program on the care and handling of sucker rods have prevented thousands of unnecessary pin and coupling failures. Our booklet entitled "The Care and Handling of Sucker Rods" is available for the asking.
Jones Sucker Rods, today, are the finest and strongest that a half century of experience can produce.
Use them on your next pumping operation and you can be sure that every joint is a tight joint.
THE S. M. JONES COMPANY
(Subsidiary of Buffalo Bolt Company)
General Office and Factory: Toledo, Ohio
Sales Office:
McBirney Building
Tulsa, Okla.
Export Office:
Buffalo International Corp.
50 Church Street
New York, N. Y.
JONES SUCKER RODS

# for exactly the Stainless Steel Tubing You Need for Any Tough Job

THE WIDE RANGE of Croloy Seamless and Welded Stainless Steel Tubes made by B&W are analyses that assure a close match between tubing properties and practically any tubing application requiring high resistance to corrosion, oxidation, scaling, breakage and creep at elevated or sub-zero temperatures. Many of these Stainless Steel analyses are available from no other source.

But the extent to which B&W can meet specific tube requirements *exactly* with Stainless Croloys goes beyond the usual commercial range of analyses. Developing special modified stainless analyses for unusual requirements in its extensive laboratory and producing them in its own modern *melting facilities* is a regular feature of B&W service on tube problems.

You can "call on Croloy", therefore, for Stainless Steel Tubing to match not just a wide range of severe service conditions, but *any* set of adverse operating conditions which only stainless steel tubing will satisfactorily withstand.

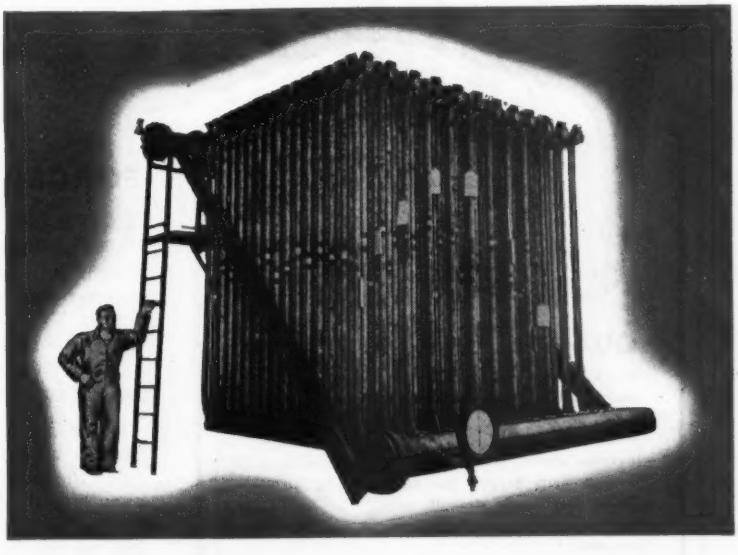
Ever since B&W produced the first stainless steel tubing commercially in the United States, Stainless Croloys have been helping to save time and expense in licking tough tubing problems in oil cracking, hydrogenation, reforming, polymerization, alkylation, gas cracking and other operations in refineries and synthetic rubber plants.

So for Stainless Tubes matched to tough jobs —exactly—call on Croloy.

**CALL ON CROLOY**

Stainless Tubing for *Effective Protection Against . . .*

WET CORROSION
DRY CORROSION
IMPAIRED FLOW
BREAKDOWN AT HIGH TEMPERATURES
SCALING
ALKALINE REACTIONS
GAS REACTIONS
EXCESSIVE RE-TUBING



Tubes in this huge catalyst case are made of a special B&W Stainless Steel developed to withstand unusually severe conditions.

Other B&W Products

THE BABCOCK & WILCOX CO.
85 LIBERTY STREET • NEW YORK 6, N. Y.

Water-Tube Boilers, for Stationary Power Plants, for Marine Service • Water-Cooled Furnaces • Superheaters • Economizers • Air Heaters • Pulverized-Coal Equipment • Chain-Grate Stokers • Oil, Gas and Multi-fuel Burners • Refractories • Process Equipment.

BABCOCK & WILCOX
SEAMLESS & WELDED TUBES
THE BABCOCK & WILCOX TUBE COMPANY
WELDED TUBE DIVISION, ALLIANCE, OHIO • SEAMLESS TUBE DIVISION, BEAVER FALLS, PA.

TA-1340

One of a series of advertisements, each discussing trapping practice on a different class of equipment.

Three steam trap draining steam line in Oklahoma refinery

# HOW TO TRAP HIGH PRESSURE STEAM LINES

*Your choice of screwed or flanged connections. Range of sizes and pressure standards.*

## QUALITY CONSTRUCTION!

- **VALVE AND SEAT.** Special chrome steel (stainless), hardened, ground, and lapped in matched sets.
- **INTERNAL TRIM.** All-stainless 18-8. Includes inverted bucket, valve lever, and guide pins.
- **CAP AND BODY.** Die forging (SAE 1030), 70,000 lbs. tensile strength.
- **BOLTS.** Supertemp, 149,000 lbs. tensile strength.
- **NUTS.** Hex, semi-finish (SAE 1030).

## —for dependable, trouble-free service

## ARMSTRONG FORGED STEEL STEAM TRAPS

IT'S EASY to get dependable, trouble-free, high pressure trap installations when you use Armstrong Forged Steel Traps and follow Armstrong recommendations. On page 19 of the Armstrong Steam Trap Book (ask for a copy) you will find complete information on figuring condensate loads . . . selecting proper size of trap . . . arranging piping for greatest convenience and best drainage.

*Here are some tips.* Calculate the "warming up" load as well as the normal radiation loss load. Consider the possibility of sudden loads due to "carry-over" or opening of closed valves. Use a trap sizing safety factor of 2 or 3 to 1, except when pressure loss in long connecting lines may make a higher factor advisable. If possible, install traps close to and below source of condensate. If check valves are needed, consider the use of Armstrong internal type check valves. ARMSTRONG MACHINE WORKS, 868 Maple St., Three Rivers, Mich.

**ARMSTRONG *Inverted Bucket* STEAM TRAPS**

*Over a Million in Use...For Power...Process...Heating*

There's more "LIFE"
in an Emsco
Wherever oil field drilling equipment is in use, you will find that Emsco products stand out because of the long life and superior performance which is built into them. Engineered to the most rigid standards of quality, they are designed to operate efficiently and economically under all drilling conditions.
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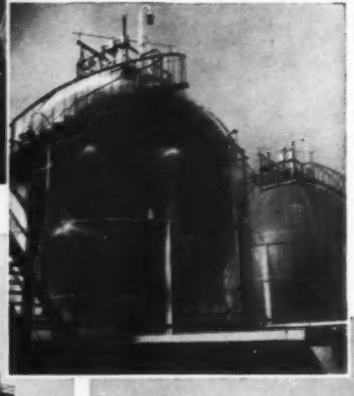
EMSCO DERRICK & EQUIPMENT COMPANY
Houston, Tex. LOS ANGELES, CALIF. Dallas, Tex.

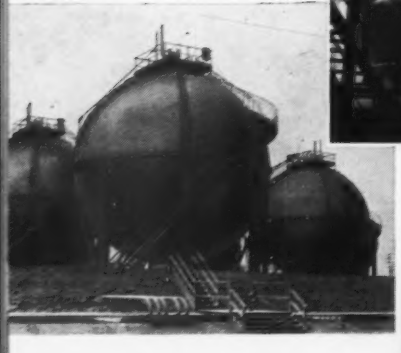
# PITTSBURGH • DES MOINES

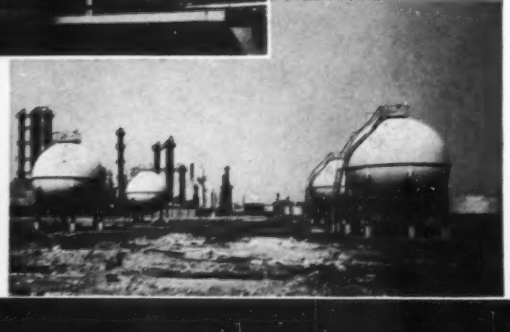
# PRESSURE SPHERES

**—Designed and built to serve your specific storage requirements**



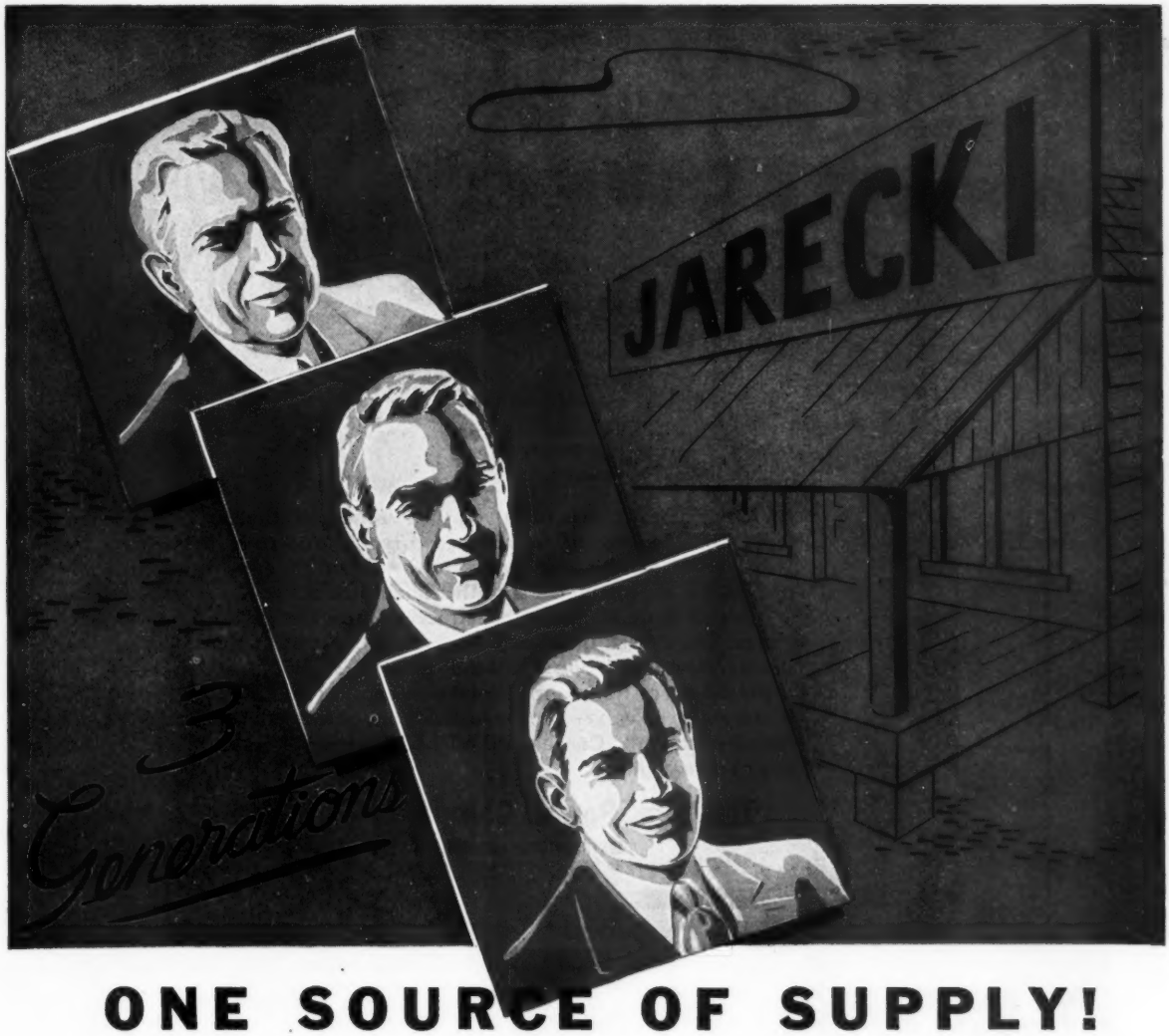
Pressure spheres for the storage of liquids and gases are designed and built by Pittsburgh-Des Moines to meet individual needs—in any type or capacity, and with accessory equipment suited to the particular requirements of the job. Our complete service is based upon many years of practical experience in this field, a continuous program of advanced research, superior fabricating facilities, and dependable construction craftsmanship. Your inquiry for an engineering consultation and estimates is invited, without obligation of any kind.





## PITTSBURGH • DES MOINES STEEL CO.

PITTSBURGH, PA., 3496 NEVILLE ISLAND—DES MOINES, IOWA, 997 TUTTLE STREET
NEW YORK, ROOM 980, 270 BROADWAY • CHICAGO, 1202 FIRST NATIONAL BANK BUILDING
DALLAS, 1201 PRAETORIAN BUILDING • SAN FRANCISCO, 603 RIALTO BUILDING
SEATTLE, 1106 FIRST AVENUE, SOUTH




# ONE SOURCE OF SUPPLY!

**Grandpa drilled in Pennsylvania, his son drilled in Oklahoma, and his son's son drills in Illinois . . . Three generations operating in different eras and using different methods, but they have this in common: All came to rely on the familiar Jarecki store for their everyday needs of oil field necessities . . . Time-tested reliability and oldtime personal service, when combined with carefully maintained stocks of modern equipment and supplies, add up to a good source of supply.**

## JARECKI

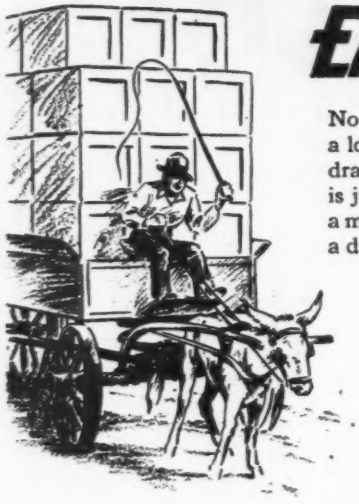
MANUFACTURING COMPANY

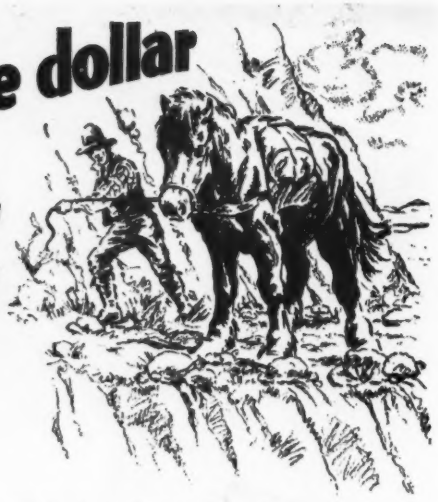
*"Since 1852"*

General Offices: St. Louis, Mo. Home Office and Factory: Erie, Pa., U. S. A. District Offices: Tulsa and Bartlesville, Okla.; Dallas and Houston, Texas; Mt. Pleasant, Mich.; Centralia, Ill.

BRANCH STORES AT ALL IMPORTANT PLACES IN THE OIL COUNTRY

# To get *more* for your valve dollar *consult* POWELL *Engineering*





No one would expect a burro to pull a load that requires a heavyweight draft horse. But a sure-footed burro is just right for carrying a pack on a mountain trail where the power of a draft horse would be wasted.

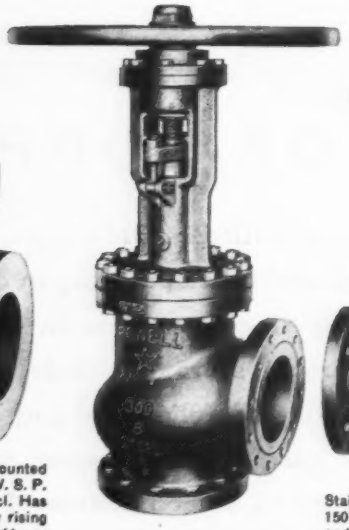
And yet when it comes to valves, such "misapplication" is often encountered. *Many cases of failure are directly due to expecting service from a valve which it was not designed to give.* Consequent replacements are costly. On the other hand, it is not sound economy to use a valve of more expensive construction than the particular service requires. The Powell Line* of Bronze, Iron, Cast Steel and Corrosion Resistant Valves, is so *complete* that there's a POWELL Valve that's *just right* for every flow control condition encountered in modern industry. When you need valves for new installations or for replacements, don't risk "misapplication". Consult POWELL Engineering and *get more for your valve dollar.*

**The Wm. Powell Company, Cincinnati 22, Ohio**

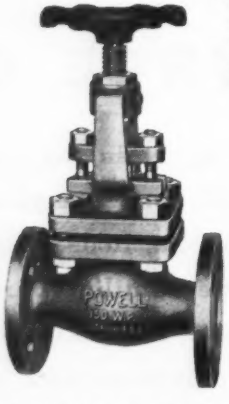
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

*In writing for catalogs kindly specify the service conditions under which the valves, in which you are interested, must operate.

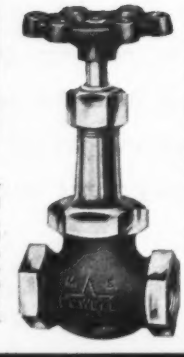
Large Iron Body Bronze Mounted Gate Valve for 125 pounds W. S. P. Made in sizes 2" to 30", incl. Has flanged ends, outside screw rising stem, bolted flanged yoke and taper wedge solid disc. Taper wedge double discs can be provided in sizes 2" to 12", incl. Seat rings and stem are bronze. Disc is bronze in 3½" and smaller size valves and bronze faced in the larger sizes. Also available in All Iron for certain services.

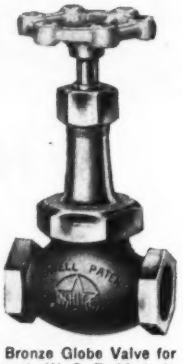


Class 300-pound Cast Steel Angle Valve. Has flanged ends, outside screw rising stem and bolted flanged yoke. Streamlined areas through the body assure maximum flow with minimum pressure drop.



Stainless Steel Gate Valve for 150 pounds W. P. Has flanged ends, outside screw rising stem, bolted flanged yoke-bonnet and taper wedge solid disc. This is one of many special Powell designs for handling corrosive media. Available in a wide range of corrosion resistant materials.

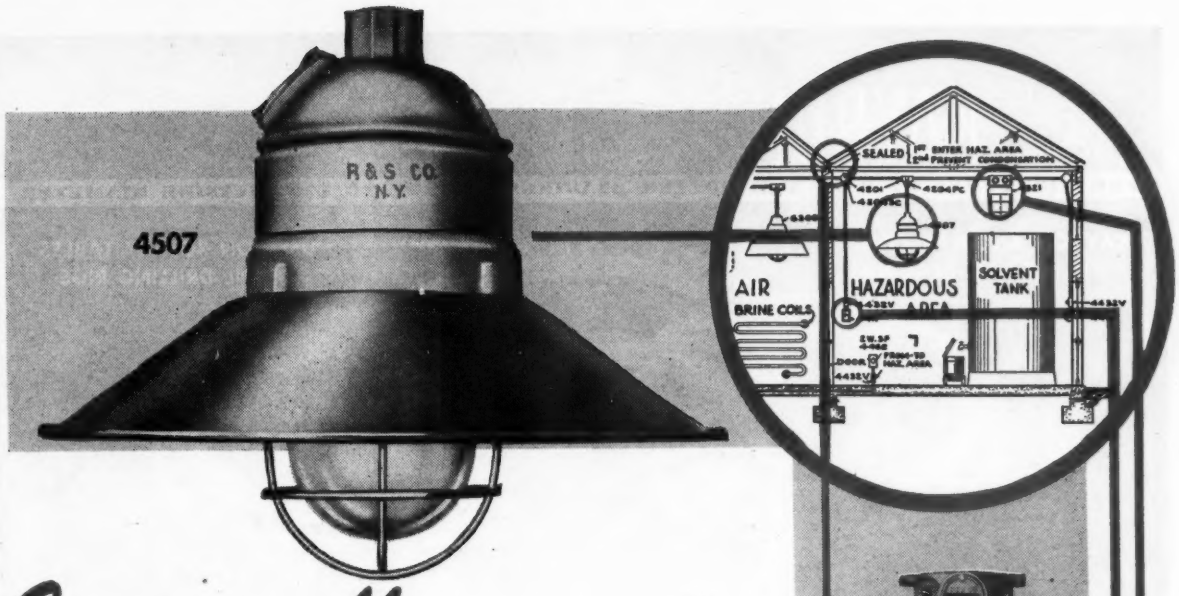




Small Bronze Globe Valve for 200 pounds W. S. P. Made in sizes ¼" to 3", inclusive. Has screwed ends, union bonnet, renewable, specially heat treated stainless steel seat and regrindable, renewable wear-resisting "Powellium" nickel-bronze disc. A long-life valve for severe service conditions.

Small Bronze Globe Valve for 200 pounds W. S. P. Made in sizes ¼" to 3", inclusive. Has screwed ends, union bonnet and renewable, regrindable hard bronze disc. An economical valve for intermediate steam, oil, water or gas lines.

# POWELL VALVES




# *Insure all Hazardous Areas*

## WITH R&S EXPLOSION-PROOF FIXTURES AND FITTINGS

The layout above shows how four R&S explosion-proof products meet the most exacting demands of safety in an extremely hazardous area.

**WHEN YOU PLAN OR REMODEL** a building, an outdoor installation, a ship or an electrical machine, it is not always possible to pre-determine the hazards it will encounter during its long life of service. With R&S, the electrical system can be made vaportight, dust-tight, moistureproof, waterproof or explosion-proof—or all five if necessary. And R&S Ever-Lok wiring devices will prevent accidental interruption of service for the life of the job.

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*He has the latest 300 page R&S Catalog No. 90. and can refer you to scores of jobs in your vicinity which have been served faithfully and well for many years. One phone call will protect your property electrically for a life time.*

*Since 1902*

**RUSSELL & STOLL COMPANY**

EXPLOSION-PROOF WATER-TIGHT AND EVER-LOK RECEPTACLES, PLUGS, CONNECTORS, SWITCHES AND FIXTURES

**125 BARCLAY STREET • NEW YORK 7, N. Y.**

Contact KAYDON of Muskegon

**FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER**

*Super-Rugged*

*...but smooth and reliable as a fine watch-movement!*

DEEPER and deeper go the oil well drillers in their constant search for petroleum reserves... and equipment is being progressively improved to meet the deep well demands. The rotary tables of powerful drilling rigs call for rugged bearings to handle tremendous loads . . . and KAYDON bearings are proving capable. They permit full and free rotation of the table, and assure smooth operation, long life, dependable performance.

The success of KAYDON bearings in husky oil field equipment is typical of improved results KAYDON is helping engineers achieve in heavy-duty machinery for steel mills, paper mills, excavating machinery, cranes, hoists, crushers and other equipment that demands rugged bearings for smooth, efficient operation.

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Counsel in confidence with KAYDON. Capacity now available for all sizes and types of KAYDON bearings . . . and for atmospheric controlled heat treating, flame hardening, precision heat treating, salt-bath and sub-zero conditioning and treatment, microscopy, physical testing and metallurgical laboratory services.

KAYDON *Types of Standard or Special Bearings:*
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THE KAYDON ENGINEERING CORP.

MUSKEGON • MICHIGAN

# ROTARY HOSE EXTRAORDINARY!

It's a tough spot in any rotary drilling rig—that loop between the standpipe and the swivel.

Tremendous pulsating pressures . . . plus cruel abrasion . . . plus oil and other enemies—it takes a real hose to do a dependable job under punishment like that.

We nominate Champion Reprene by Republic Rubber. It can and does take a beating without leaking or blowing off. It's built that way. Oil-resistant synthetics. Many plies of heavy duck. Spirally-wound high-tensile wire. Built-in couplings. Lots of honest workmanship.

When you are ready to move in on your next job, remember this: your Jones & Laughlin Supply store has Champion Reprene Rotary Hose by Republic, engineered for extraordinary service in that tough loop between the standpipe and the swivel.

## CHAMPION REPRENE *by* REPUBLIC

## JONES & LAUGHLIN SUPPLY COMPANY

Subsidiary of Jones & Laughlin Steel Corporation

J&L STEEL

TULSA, OKLAHOMA

*Simple, Quick, Strong*

LEAKPROOF CONNECTIONS

# ROLAGRIP PIPE COUPLINGS

For
Plain End
Pipe
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Eliminates
Threading
Grooving
Flanging
Welding
★

Here is another of hundreds of pipe connections that this simple, strong, time-tested pipe coupling accomplishes in the production, handling and distribution of petroleum.

Whether the pipe connection is permanent or temporary, Rolagrip Pipe Couplings make the connection easier and faster for less money because they eliminate all the expensive pipe preparation of threading, grooving, flanging, etc. . . . in addition to subsequent fitting operations.

Rolagrips' other advantages are equally suited in the coupling of petroleum pipe lines. Absolutely leakproof, Rolagrip Pipe Couplings are provided with a long wearing, oil-resistant synthetic gasket. Rolagrips are flexible—allow an average angular deflection of 5 degrees. They are 100% reclaimable—can be used from job to job over and over again.

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# PROPER HEAT TREATING GIVES TESCO *Quality* STEEL MAXIMUM STRENGTH . . .

● These Tesco Quality Steel Castings are about to be liquid quenched. Less than 25 seconds after Tesco Quality Steel Castings are lifted from the furnaces, they are liquid quenched at the exact temperature specified. No heat is lost. This modern technique insures correct hardness, maximum strength and ultimate benefits from alloys carefully blended into the steel. Tesco Liquid Quench Quality Steel Castings have far greater yield and tensile strength than annealed castings, plus greatly improved ductility. The liquid quench also assures uniformity, freedom from hard spots, better machineability. No other foundry in the Gulf Coast is equipped with the same modern heat treating facilities as Texas Electric Steel Casting Company. Look for the Tesco "T" on your steel castings. It's recognized as a symbol of quality throughout the oil industry.

Symbol of Quality wherever men drill for oil

**TEXAS ELECTRIC STEEL CASTING CO.**

GOOD CASTINGS TESCO HOUSTON, TEXAS

# IT ADDS UP

UNIBOLT
FLOW MANIFOLD

MASTER VALVE

TUBING HEAD

= TREE

# UNIBOLT FLOW MANIFOLDS

## make strong, compact, light-weight trees . . . for any pressure

The UNIBOLT Flow Manifold is a complete pre-tested Christmas tree, less master valve and tubing head. Each unit of the manifold is of standard UNIBOLT design. The top fitting with UNIBOLT connection simplifies running pressure bombs or paraffin scrapers, and may be a cross for double wing trees or a tee (as illustrated) for single wings. This fitting can be furnished in any size or flange necessary to fit the master valve and is provided with a 2" side outlet.

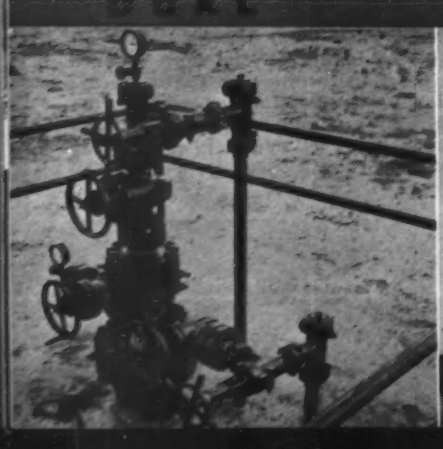
Note that UNIBOLT Adjustable Wing Valves rather than conventional gate or plug valves, are used in the manifold. Since the well is usually produced through a small positive choke, resulting in low velocity flow through the manifold, the 1-inch opening in the Adjustable Wing Valve is ample.

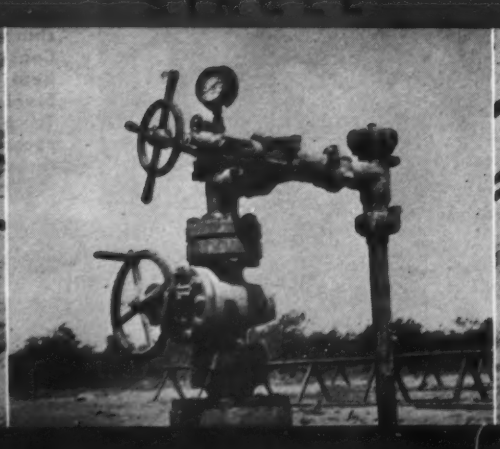
A UNIBOLT Choke Body, fitted with positive bean (either "X" type or 1/64 increment type) and bleeder type blanking plug provides trouble-free flow control.

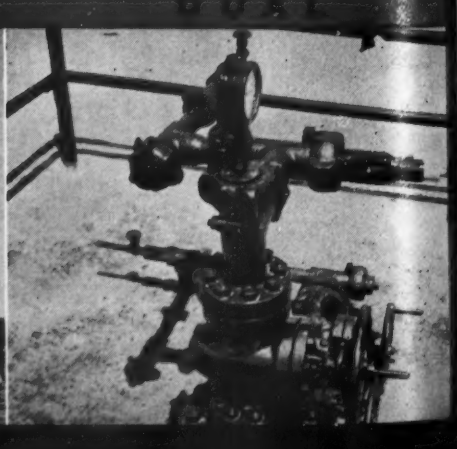
Because its parts are interchangeable and easily replaceable, including the wing valve stem and seat, the unit may be completely overhauled on the well. For extreme abrasive conditions, hard chrome stems and seats are available.

Send for the new UNIBOLT Catalog for complete details.

**THORNHILL-CRAVER COMPANY, INC.**
HOUSTON, TEXAS



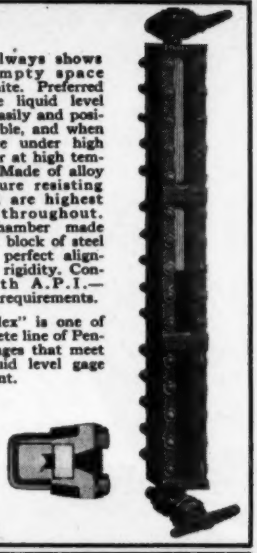




## PENBERTHY
"REFLEX"
DROP FORGED STEEL LIQUID LEVEL GAGES

Liquid always shows black—empty space shows white. Preferred where the liquid level must be easily and positively visible, and when liquids are under high pressure or at high temperature. Made of alloy temperature resisting steel and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

The "Reflex" is one of the complete line of Penberthy Gages that meet every liquid level gage requirement.



PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

## PENBERTHY
"REFLEX"
WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
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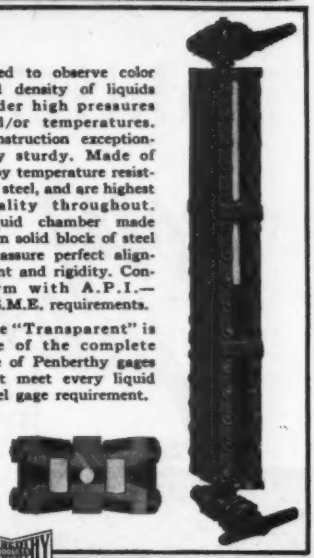
"TRANSPARENT"
DROP FORGED STEEL LIQUID LEVEL GAGES

Used to observe color and density of liquids under high pressures and/or temperatures. Construction exceptionally sturdy. Made of alloy temperature resisting steel, and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

The "Transparent" is one of the complete line of Penberthy gages that meet every liquid level gage requirement.



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SUMP PUMPS

Used wherever seepage water accumulates, the Penberthy Automatic Electric Sump Pump and the Penberthy Automatic Drainer (water or steam operated) have demonstrated their superiority in this service. Simple and rugged design—copper and bronze construction throughout.

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The accepted method for assuring an uninterrupted supply of feed water to oil field boilers. Penberthy Automatic Injectors will supply feed water to boilers at minimum cost, are quickly and easily installed, reliable under most severe operating conditions, require little attention and no careful handling. Highest quality design and rugged construction.

PENBERTHY INJECTOR CO.
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EJECTORS

Use the power of steam, air or water under pressure to lift liquids. Being simple jet pumps they have no moving parts and require no lubrication. A variety of models to meet different conditions. Also used as water heaters.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

# .....This..... is really an addition to *your plant!*

*says:*

J. G. Clausen

**Nalco Representative**
**Western New York State**

*Nalco General Laboratories*

THERE are two reasons why we say that Nalco, its Laboratories and Service Organization, is really an addition to your plant:

First, it was conceived as a service to power plant engineers . . . the only means of getting the best possible water treatment information and action on an *individual plant basis.*

Second, on the theory that the Nalco Laboratories belong to practicing power plant engineers, the scientists and chemists who operate them are primarily concerned with the plant problems brought to them by Nalco Service Engineers . . . An interest that has enabled Nalco to contribute heavily to most successful modern water treatment practices.

Therefore, it is easy to see that the world's finest water treatment laboratories are, indeed, a part of your plant . . . Your facilities to use whenever necessary to get the best possible answer to your water treatment and control problems.

You are invited to put your Nalco Laboratories to work, now. Ask for a Nalco Survey that will give you a detailed picture of your present water treatment situation. Recommendations (if necessary) will be made to help you achieve the many advantages of complete scientific water treatment.

THE SCIENTIFIC WATER TREATMENT FOR ALL INDUSTRY

**NATIONAL ALUMINATE CORPORATION**

**6242 West 66th Place, Chicago 38, Illinois**

*Canadian inquiries should be addressed to*
*Aluminate Chemicals, Ltd., 555 Eastern Ave., Toronto, Ont.*

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# HAPPEN!

● It's amazing what a bit of corrosion can cause . . . or a weakened vessel . . . or a leaky valve. And it's equally amazing how UOP Inspectors detect these potential danger points. It's their job . . . day in and day out . . . serving UOP licensees. And they're experts at it.

They get at the bottom of things. They find out what, if anything, is likely to cause trouble. And they recommend the necessary steps to correct the condition.

That means safety. It means uninterrupted production. It means untold dollars saved. It can easily mean the difference between profitable and unprofitable operation.

With the same thoroughness, automatic control equipment is checked at frequent intervals by UOP Instrument Men. And, of course, UOP Engineers and Laboratory Technologists are always available for the study and solution of any refining problems that may arise.

It's impossible to estimate the value of this service. Its effectiveness can only be measured by the things that *don't* happen . . . accidents — fires — shut-downs — delays — low yield. But the results . . . safe, efficient, economical operation . . . are quite evident.

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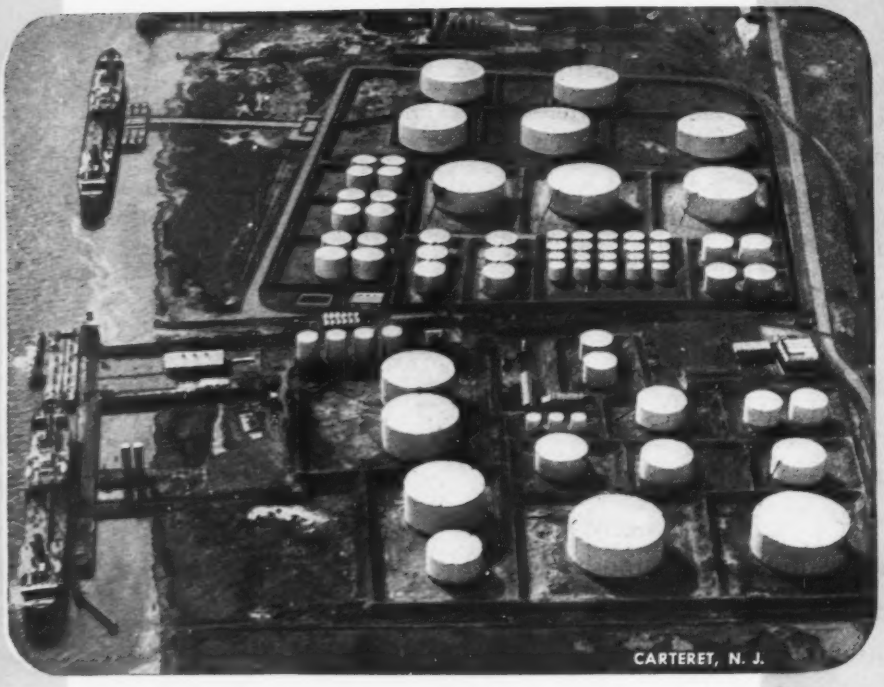
LABORATORIES: RIVERSIDE, ILLINOIS

UNIVERSAL SERVICE PROTECTS YOUR REFINERY

# THESE ARE YOUR
# TERMINALS

## THE WORLD'S MOST COMPLETE WAREHOUSE SYSTEM FOR LIQUIDS

HOUSTON



CARTERET, N. J.

WEST

CORPUS C

General American Tank Storage Terminals . . . equipped to handle any liquid that can flow through a pipeline* . . . provide you the same privacy, the same specialized facilities, the same skilled handling as your own private terminal. Find out how General American Tank Storage Terminals can mean safer, more profitable storage and distribution for your bulk liquid product.

*Here is a partial list of the bulk liquids handled at General American.

| | | |
|---|---|---|
| Gasolines | Toluol | Coconut Oil |
| Lubricating Oils | Benzol | Fish Oil |
| Naphtha | Xylol | Cotton Seed Oil |

GOODHOPE

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GENERAL AMERICAN

Operator of the World's G
Public Tank Storage Sy
for Liquid Commodi

## GENERAL AMERICAN TANK STORAGE TERMINALS

*Division of GENERAL AMERICAN TRANSPORTATION CORPORATION*
*135 South La Salle Street • Chicago*

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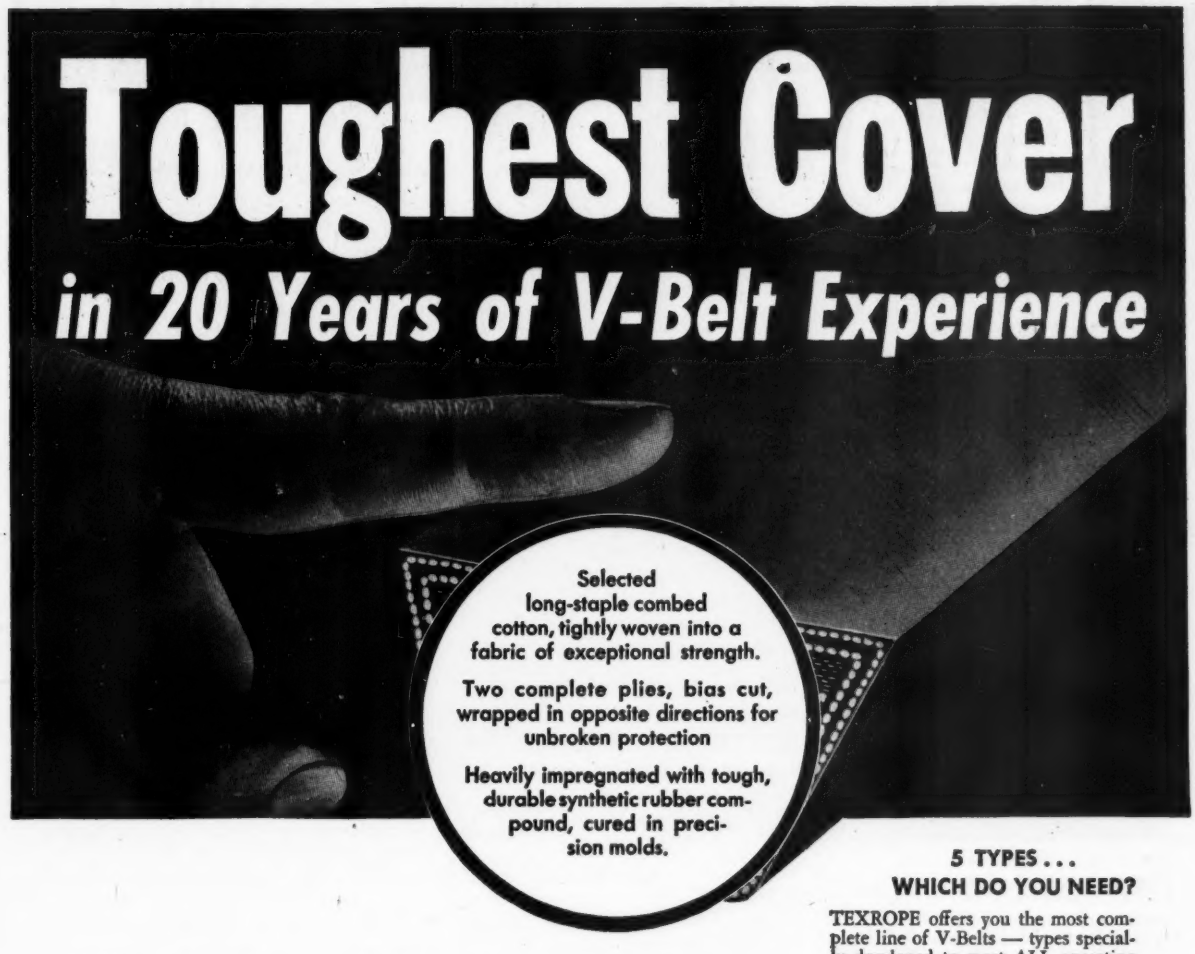
# Toughest Cover
## in 20 Years of V-Belt Experience


Selected long-staple combed cotton, tightly woven into a fabric of exceptional strength.
Two complete plies, bias cut, wrapped in opposite directions for unbroken protection
Heavily impregnated with tough, durable synthetic rubber compound, cured in precision molds.

## Allis-Chalmers Builds Longer Life Into Famous TEXROPE V-Belts

A V-Belt is no better than its COVER. And . . . TEXROPE Super-7 belts today carry the toughest, most wear-resistant cover that Allis-Chalmers has developed since they invented the Multiple V-Belt Drive! It's the result of 20 years of continuous research and improvement.

This tough, resilient sheath is unbroken and unweakened by grooves or serrations. It takes the wear, holds the belt in shape, protects the load-carrying core structure.

**Added Strength — Smoother, Cooler Running**

*50% Stronger Cords,* impregnated with friction-fighting gum rubber. *War-proved Buna-S,* better, cooler-running than natural rubber. *Perfect Balance,* every belt accurately proportioned, precision molded to run true and cool. Make Allis-Chalmers your V-Belt headquarters! ALLIS-CHALMERS, Milwaukee 1, Wisconsin.

A 2003

**5 TYPES . . . WHICH DO YOU NEED?**

TEXROPE offers you the most complete line of V-Belts — types specially developed to meet ALL operating conditions. Pick the right TEXROPE Super-7 V-Belt — it'll give you the most in efficient power transmission.

**Heat-Resisting Super-7**
Stands temperatures up to 180°. The TEXROPE V-Belt for most drives.

**Oil-Resisting Super-7**
Neoprene cover protects core against moderately oily or greasy conditions.

**Oil-Proof Super-7**
Made of Neoprene throughout. Use it when the belt must swim in oil.

**Static-Resisting Super-7**
Recommended where explosion hazard exists. Static-conducting element throughout cover won't wear off.

**Super-7 Steel**
Twin steel cables, to pull extremely heavy loads with minimum stretch.

GET THEM — through your Allis-Chalmers district office or dealer.

TEXROPE Super-7 V-Belts result from the cooperative research of two great companies—Allis-Chalmers and B. F. Goodrich — and are sold exclusively by A-C.

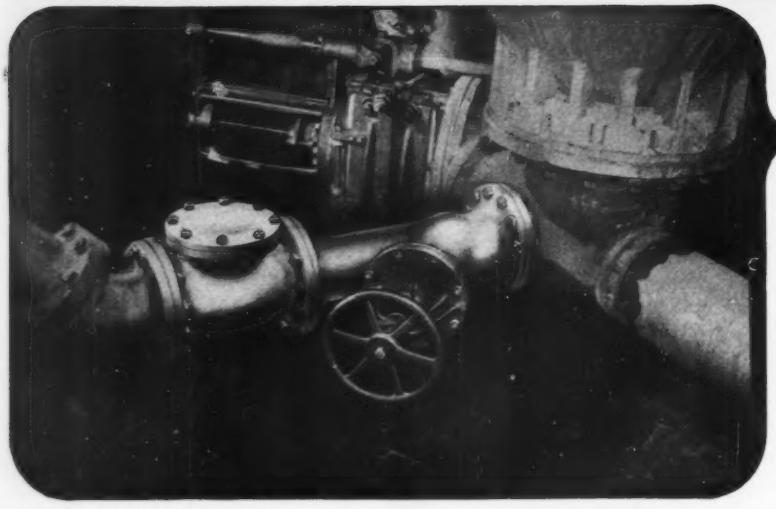
**V-BELTS**
TEXROPE complete line — Sizes, types for every power transmission problem and condition.

# ALLIS CHALMERS
## TEXROPE V-BELT DRIVES
*ORIGINATORS OF THE MULTIPLE V-BELT DRIVE*

**SHEAVES**
"MAGIC-GRIP" . . . TEX-STEEL . . . TEXDRIVE . . . Speed changers and VARI-PITCH sheaves.

# ALOYCO STAINLESS STEEL VALVES

## ..install them and forget them



### HANDLING HOT SULFITES SINCE NOVEMBER 18, 1929

**6″ Aloyco Check Valve and 6″ Aloyco "Y" Valve handle hot calcium bisulfite solution containing 6 to 7% total $SO_2$, and 5 to 6% free $SO_2$. Also, note 10″ Aloyco Blow Valve in rear.**

*Photos Courtesy of Eastern Corporation*

### ALSO INSTALLED NOVEMBER 18, 1929

**2½″ Aloyco Side Relief Valve handles hot calcium bisulfite solution containing about 3% total $SO_2$. The ¾ inch angle sampling valve shown is also an Aloyco.**

### HOT RELIEF AND COLD ACID

**This 8″ Aloyco "Y" Valve handles relief containing up to 85% $SO_2$ and cold acid.**

● Are you valve conscious? Do corrosion, contamination, abrupt temperature changes and other rigorous service conditions give you valve trouble? If so, it will pay you to get in touch with us and find out how Aloyco Valves in the correct analysis of stainless steel can help you "install them and forget them."

The photographs here show Aloyco Stainless Steel Valves in operation in the paper mills of Eastern Corporation since 1929—and still going strong. They are used in the toughest spots in the sulfite mill for blowdown and relief line service.

Aloyco Valves are available in a wide range of stainless steels and corrosion resistant alloys. Large selection of types and sizes for 150 p.s.i. to 600 p.s.i. service. Write today for detailed information.

ALOYCO

**STAINLESS STEEL VALVES AND FITTINGS**

GATE, GLOBE, Y, CHECK, TANK, SAMPLING AND V-PORT VALVES
SCREWED, FLANGED AND WELDED FITTINGS

ALLOY STEEL PRODUCTS COMPANY, INC.

**Another example of Taylor Forge "know-how" that means extra value in WeldELLS**

# *Rare specimen in Welding Tees-*

● *When you think of a reducing tee you always picture it as reducing in the branch. But this one, for the peculiar purpose it serves, had to be made the other way around. It's a seamless, carbon-moly forging, five inches in the run with a seven-inch branch—an "increasing" tee, so to speak; one more example of those kinks that are found so abundantly in the Taylor Forge bag of tricks.*

The "know-how" acquired during many years of performing these special—often extremely difficult—manufacturing operations, has a mighty important bearing on our standard line of WeldELLS, Welding Tees and other Taylor Forge Welding Fittings.

It means that in developing WeldELLS we did not have to ask what kind of fitting is easiest to manufacture. Instead we asked what comprises the ideal fitting, and then, with every special facility and process at our command, made that conception a reality.

That is why WeldELLS have tangents . . . why they have extra reinforcement where service stresses are greatest . . . why they have such extremely accurate dimensions . . . why they have the features listed opposite . . . why, in short,

## WeldELLS have everything

**WeldELLS alone combine these features:**

- **Seamless** — greater strength and uniformity.
- **Tangents**—keep weld away from zone of highest stress—simplify lining up.
- **Precision quarter-marked ends**—simplify layout and help insure accuracy.
- **Selective reinforcement** — provides uniform strength.
- **Permanent and complete identification marking**—saves time and eliminates errors in shop and field.
- **Wall thickness never less than specification minimum**—assures full strength and long life.
- **Machine tool beveled ends**—provides best welding surface and accurate bevel and land.
- **The most complete line of Welding Fittings and Forged Steel Flanges in the World** — insures complete service and undivided responsibility.

TAYLOR FORGE & PIPE WORKS, General Offices & Works: Chicago, P.O. Box 485
New York Office: 50 Church Street • Philadelphia Office: Broad Street Station Bldg.

# Johns-Manville Announces

# *Fifty Million Dollar*

**Multi-Million-Dollar "Test Tube"** for actual experimental factory production, as well as fundamental research, now under construction near Bound Brook, N. J. The Johns-Manville Center ultimately will include six large buildings. Innovations in the first unit include ten experimental factories under one roof; a movable rear wall to permit temporary or permanent additions, or to accommodate extra-large machinery; a special system of interior construction to provide flexibility to meet changing needs for laboratory facilities.



**Dr. C. F. Rassweiler,** Vice-Pres. of Johns-Manville Corporation in charge of research and development, states:

"We are living in an era of scientific improvement unparalleled in man's history. One single development stemming from social and economic needs can bring revolutionary changes throughout an industry. Today, we stand on the threshold of a new era, which has unlimited horizons for the development and improvement of new products for home and industry.

If this goal is to be achieved, some individual or group of individuals must have the imagination, courage and facilities to meet the challenge.

Johns-Manville has accepted this challenge and is now in the process of constructing the world's largest research laboratory devoted to service through science for better homes and greater industrial efficiency."

JOHNS-MANVILLE JM PRODUCTS

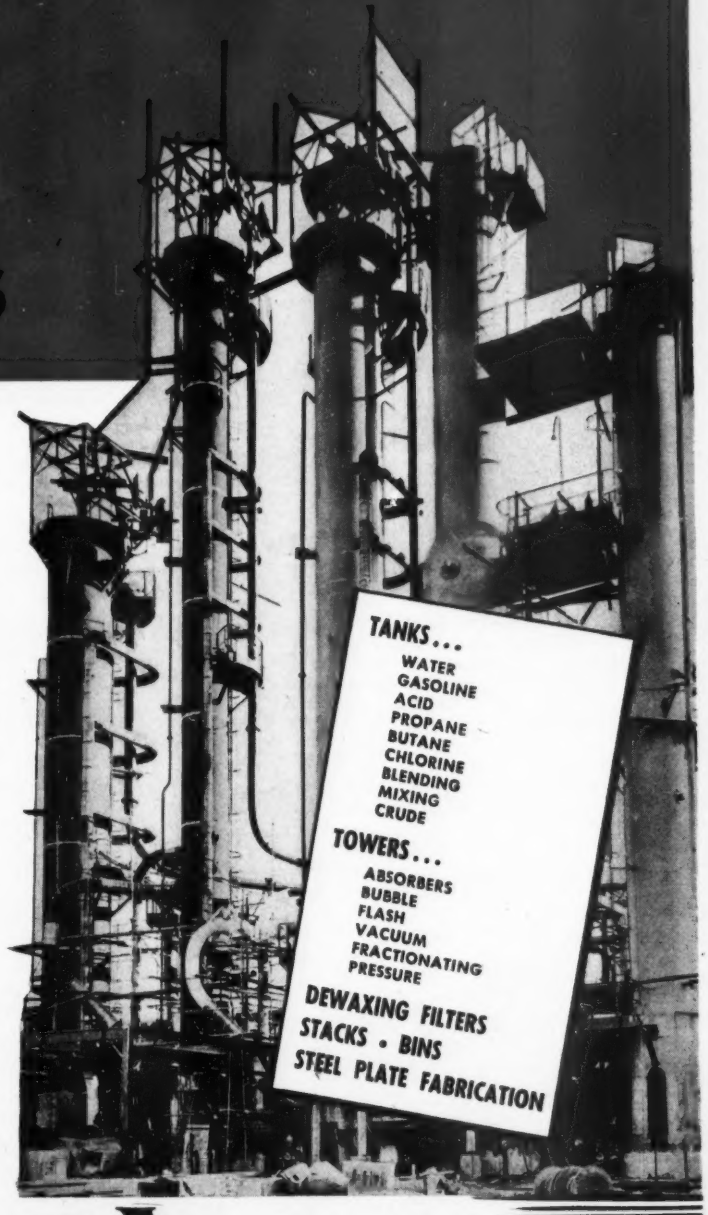
# Johns-Manville

# General American

## steel plate fabricated equipment

*is installed in*

## LEADING REFINERIES




**All units, pressure vessels, towers, tanks, bins, stacks, etc. have one distinctive feature—they do a better than ordinary job of providing safe, dependable, trouble-free service.**

**This better than ordinary job is possible because General American has extensive shop facilities. The personnel is experienced—has the necessary "know-how" and pride of workmanship—which results in equipment which provides superior performance on the job.**

**On your next plate fabrication job—carbon, stainless, alloy steels, Everdur, aluminum or special alloys—ask for our recommendations and quotation.**

# General American
## TRANSPORTATION CORPORATION

**process equipment • steel and alloy plate fabrication**

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**WORKS:** Sharon, Pa.; East Chicago, Ind.

GATX GENERAL AMERICAN

**OFFICES:** Chicago, Louisville, Cleveland, Sharon, Orlando, St. Louis, Salt Lake City, Pittsburgh, San Francisco, Washington, D. C.

# INTERNAL SAFETY VALVES

**FIGURE ST-709**

**In this lever model, the release of an exterior counterweight causes closing of the valve. Design precludes damage to tank roof from influencing operation in any way.**

**FIGURE ST-605**

**Designed for operators who object to stuffing boxes, this model utilizes a cable which passes through a gas tight cable sheave case installed on the tank roof.**

**FIGURE ST-885**

**A spring loaded, bronze safety valve which screws directly into the tank spud. A sturdy installation which provides maximum protection at lowest cost for bulk storage tanks.**

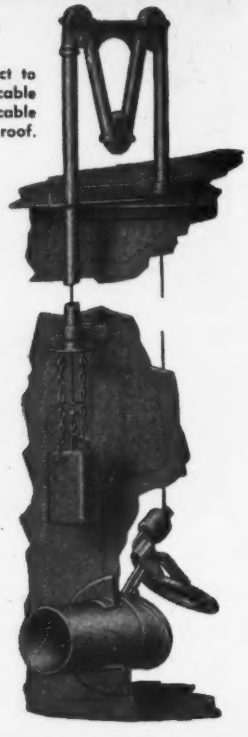

**FIGURE ST-1640**

**This is a cast steel, spring loaded internal safety valve recommended for bulk storage tanks. Withstands a back pressure of 45 lbs. so plant pumping system can employ manifolded lines without contaminating tank contents.**

The S. & J. Internal Safety Valves for refinery and bulk storage tanks illustrated here, were all designed to protect against loss of tank contents from bursting lines caused by excess pressures due to ground fires.

Were it always possible to reach the tank outlet during a fire, a gate valve might serve the purpose adequately, but accessibility is always the unknown factor.

In the S. & J. designs shown here, closure is always automatically provided by the melting of a fusible link in the event of ground fires, and excess pressures due to thermal expansion always relieve themselves back into the tank.

Complete details and prices on any of the valves shown will be furnished upon request.

S&J

SHAND & JURS CO.

BERKELEY, CALIFORNIA

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# WHEATLEY

# ALUMINUM *Pumps*

In keeping with the Wheatley policy of designing equipment for industry's needs tomorrow **the development of Aluminum Pumps marks another Wheatley FIRST!**

Weight has always been the millstone of portable pumping; so imagine, for efficiency's sake, a pump that will deliver the same amazing performance record of standard Wheatley models, **yet a pump which weighs only about one-third as much!** Revolutionary . . . yes, but the Wheatley Aluminum Pump has made possible this inevitable advancement in portable pump design.

To facilitate deliveries all castings are poured in the Wheatley foundry to Wheatley specifications. Available in several models.

**WHEATLEY ENGINEERING ANTICIPATES TOMORROW FOR INDUSTRY'S** WHEATLEY **ADVANCEMENT AND EFFICIENCY**

*Turn Page* ■■➡

WHEATLEY

# ALL BRONZE

## SALT WATER PUMPS

For pumping operations involving salt-water disposal the Wheatley ALL BRONZE fluid end pumps insure the highest number of working hours without shutdown for repairs.

Wheatley dependability, coupled with the non-corrosive characteristics of bronze gives the lowest maintenance cost and the highest volume of liquid moved. It's the PRACTICAL pump for salt water disposal.

**ANTI-CORROSION:** Fluid end is all bronze—including pistons, rods and rings . . . stops corrosive action of salt-water.

**CAREFUL CONSTRUCTION:** Sturdy, compact design with the Wheatley mark of dependable craftsmanship. Suction manifold connects to either side of pump. Strainer basket removable without disconnecting manifold. Graduated, interchangeable liners take few minutes to change in the field.

**MAXIMUM VOLUME AT HIGH PRESSURES** Some models have been factory tested for working pressures up to 5,000 lbs. per square inch. Available in sizes 4" x 6", 6" x 6", 5" x 10" and 7" x 10" . . . V-Belt or Direct Driven.

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**FRANK WHEATLEY PUMP & VALVE MFR., Tulsa, Oklahoma**

Refinery equipment of every description being offered for sale in units or single pieces. This is the outstanding buying opportunity of the year! No waiting or promise of later delivery. All material offered for sale for *immediate delivery*. First come—first served! Don't wait! Get in touch with us now.

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***Many other Items too numerous to Mention***

Our engineer and representative at the plant site daily to show you around. Inspection of equipment can be made at any time. We strongly recommend that you send your engineer or representative to inspect this plant and fill your requirements instead of waiting indefinitely.

**WRITE WIRE or PHONE**

# SAMPSON MACHINERY & SUPPLY COMPANY

**INGLESIDE, TEXAS**
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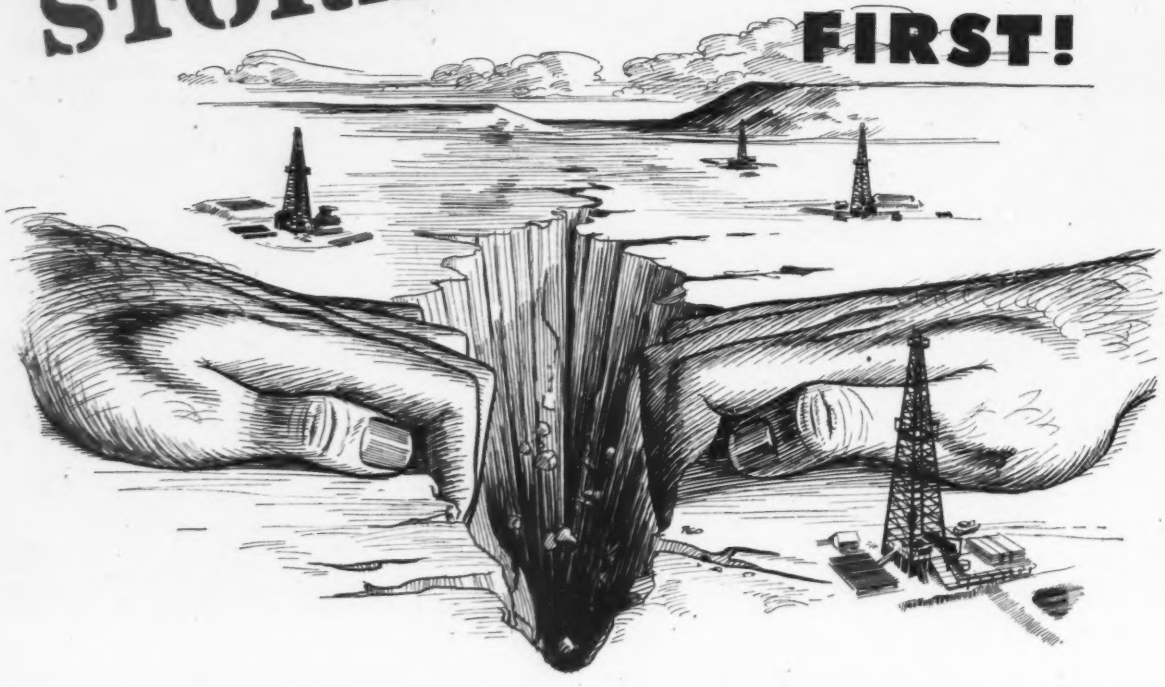
**Telephone No. 6** **P. O. Box 995**

MAX CLAIRFIELD, MANAGER

# check this STORAGE SPACE FIRST!



To determine the economic feasibility of completing a well, Porosity● of the producing formation should be considered with the same importance as initial exploration, drilling and development costs.

Porosity, or that percentage of total volume of the formation which is fluid storage space, can vary from a minimum of 8 to 10% in low permeability sands, to a maximum of 35 to 38% in high permeability formations.

By determining the pore space content of the producing formation and deducting connate water and residual oil (non-recoverable), the remaining percentage of porosity, corrected for shrinkage effects, may be expressed as total barrels of oil potentially recoverable per acre foot. Recoverable reserves for that formation are then known.

Core Laboratories, Inc., in offering *complete* Core Analysis and Reservoir Fluid Analysis (the Measured Data Plan), is *first* in the advancement of Petroleum Reservoir Engineering.

*●Porosity is a measure of the storage capacity of the sand, usually expressed in per cent.*

CORE LABORATORIES, INC. ● DALLAS 5, TEXAS

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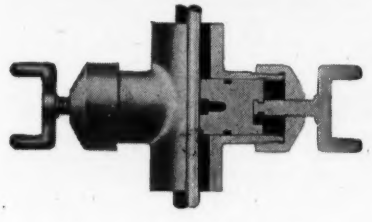
PETROLEUM RESERVOIR ENGINEERING

Say "DOUBLE E"

WHEN YOU WANT .... The Best

BLOWOUT PREVENTER



The "Double E" Blowout Preventer for sucker or polished rods works on the same principle as the stripper but is constructed somewhat differently. Instead of the soft rubber packing, cylindrical steel rams are used, to which has been moulded a fabric reinforced sealing element. This oil resistant synthetic rubber element backed by the steel ram prevents leakage against high pressure.

The use of the Blowout Preventer in conjunction with the Sucker Rod Stripper provides ideal protection against handling wet rods and pressure surges in heading wells.

"DOUBLE E" Products

EQUIPMENT ENGINEERS

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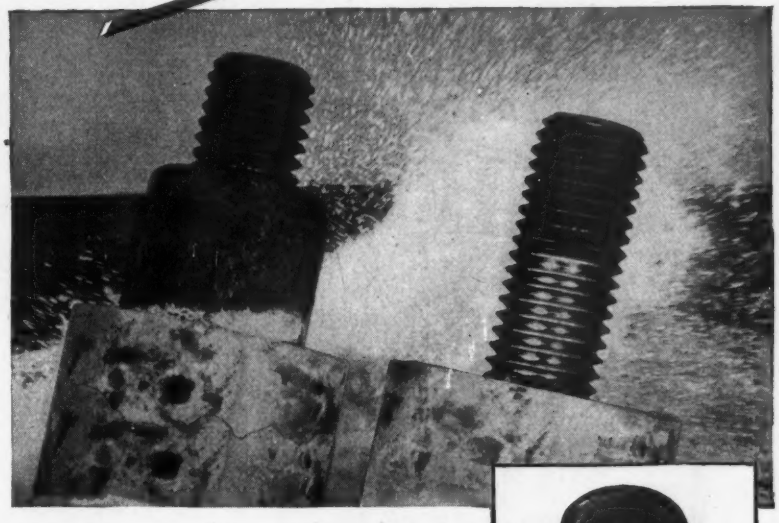
SELF-SEALING TO Prevent Corrosion OF BOLT THREADS



*—with the Red Elastic Collar that protects the threads against Liquid Seepage*

Moisture cannot penetrate the Red Elastic Collar. Study the heavily corroded bolt and nut assembly in the unretouched test photograph. It has been subjected to the equivalent of three years' exposure to moisture . . . to industrial smoke and grime . . . to climatic change. Study the same bolt with the nut removed. Look at the bolt threads that were inside the Elastic Stop Nut. They're as good as new! Why? Because the Red Elastic Collar protects them permanently against Liquid Seepage—and Corrosion.

Elastic Stop Nuts are easily removed because they cannot 'rust solid'. They prevent fasteners from failing because of corrosion weakened threads.

Here's a challenge: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. For further information or literature address: Elastic Stop Nut Corporation of America, Union, New Jersey. Agents and Representatives located in principal cities.

**The RED ELASTIC COLLAR**

—denoting an ESNA product—

. . . is threadless and permanently elastic. Every bolt—*regardless of commercial tolerances*—impresses (does not cut) its full thread contact in the Red Elastic Collar. This threading action produces a compressive, radial-reactive pressure against *both* the top and bottom sides of the bolt threads . . . insures a permanently tight, full contact between the bolt and nut threads . . . and makes all Elastic Stop Nuts self-sealing against Liquid Seepage.

As a result, all Elastic Stop Nuts protect permanently against thread corrosion.

ESNA

ELASTIC STOP NUTS

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*PRODUCTS OF:* ELASTIC STOP NUT CORPORATION OF AMERICA

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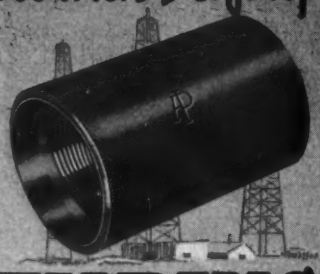
Cities Service offers the housekeeper, the automobile owner, the farmer and the industrialist more than 400 quality products derived from petroleum. Each separate product is specially made for its special service, and represents special handling and knowledge in its production.

Coupled with Safety

WHEN YOU USE X-L QUALITY



## OIL WELL TUBING COUPLINGS

You can always be sure of tight, trouble-free joints when you specify "X-L" Quality Couplings. Available in Plain or External Upset for standard tubing. Made from steel. Tested by Comparator to assure strict adherence to A.P.I. standards.

*When ordering, please use our catalog description; it will save time and error.*

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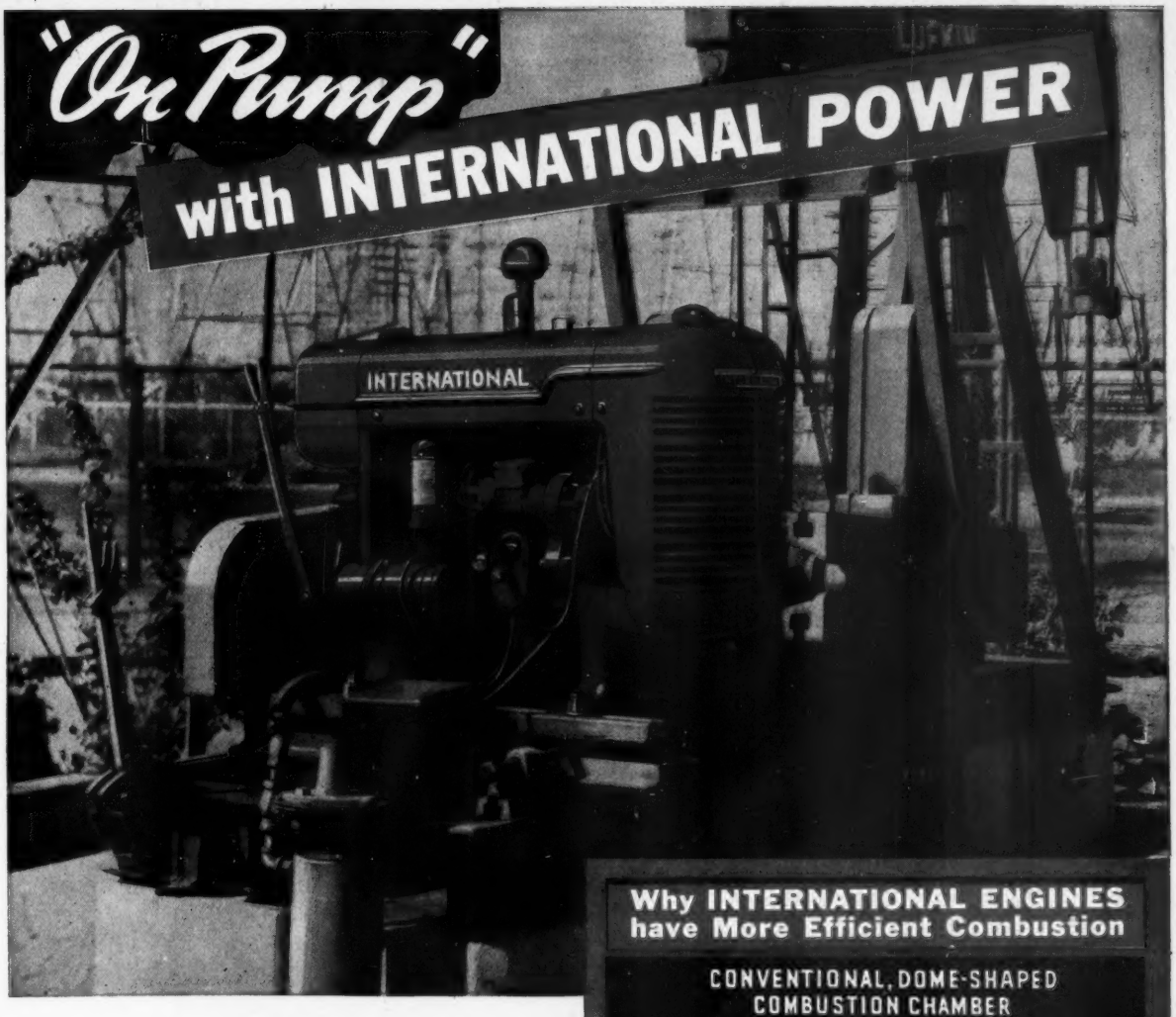
# "On Pump" with INTERNATIONAL POWER



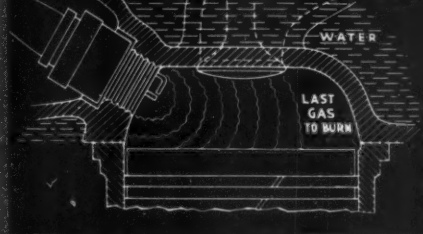

YOU CAN DEPEND on efficient, 24-hour-a-day pumping power when your wells are "on pump" with International carburetor-type engines. Specially designed combustion chambers give you smoother, more economical operation and longer engine life. Internationals are precision-built to give you continuous peak performance and they're *rugged* to minimize maintenance costs.

Your International Industrial Power distributor has all the facts and figures. Let him show you how production goes up and costs go down when your wells are "on pump" with International Power.

*Industrial Power Division*
**INTERNATIONAL HARVESTER COMPANY**
**180 North Michigan Avenue** **Chicago 1, Illinois**

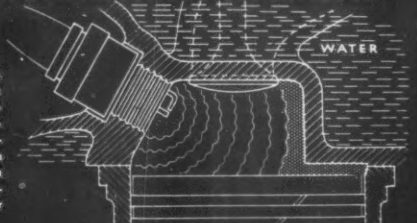
## Why INTERNATIONAL ENGINES have More Efficient Combustion

### CONVENTIONAL, DOME-SHAPED COMBUSTION CHAMBER



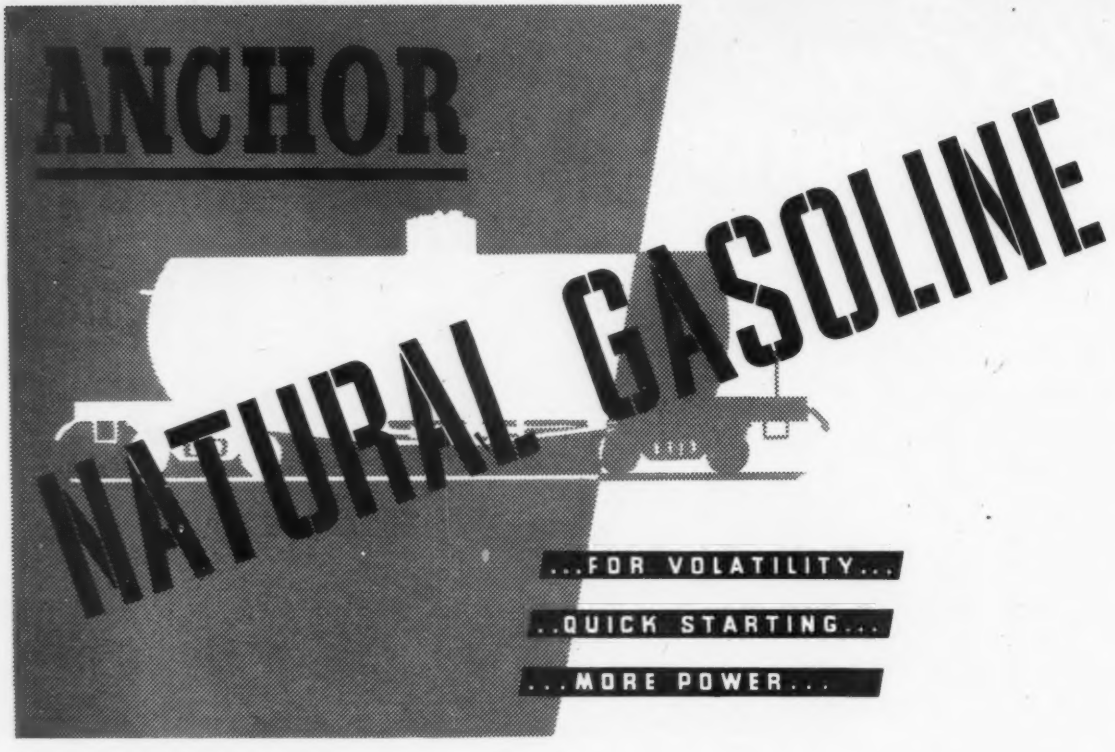

Last gas mixture to ignite frequently ignites all at once due to heat from previously ignited gas, causing engine knock.

### INTERNATIONAL COMBUSTION CHAMBER




All of last gas mixture to ignite is close to cooling water, permitting progressive uniform ignition for high thermal efficiency and smoother operation.

**INTERNATIONAL** INTERNATIONAL HARVESTER **ENGINES**

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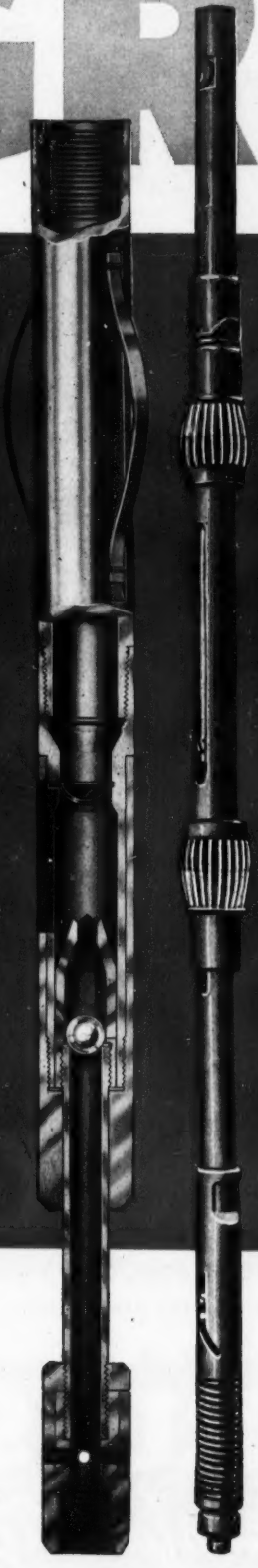

*Announces* the appointment of exclusive well cleaning service agents for Texas and Louisiana.

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## *in hundreds of Cooling Towers*

**The G-R BENTUBE SECTION**

The best cooling tower may be limited by an atmospheric cooler or condenser that has a low heat transfer rate or that accumulates scale from hard water.

G-R Bentube Sections have higher heat transfer rates than cast iron sections or pipe coils. In contrast to straight tube sections, they maintain rated capacity continuously and without the necessity of hand-scaling, because their patented scale-shedding feature keeps scale from building up.

These are only a few of the distinctive advantages that have made the G-R Bentube Section the most widely used atmospheric cooler and condenser . . . more than 8000 sections in service. Write for Bulletin 1601 describing these units in detail.

**THE GRISCOM-RUSSELL CO.**
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Tees, Reducers, Flanges and Welding Caps

**NATIONAL**
Pipe and Steel Tubes

**CHASE**
"Antimonial Admiralty" Condenser Tubes

Following a policy of being identified with the leading manufacturers

**VINSON SUPPLY CO.**

announces appointment as distributors for:

*Nordstrom*

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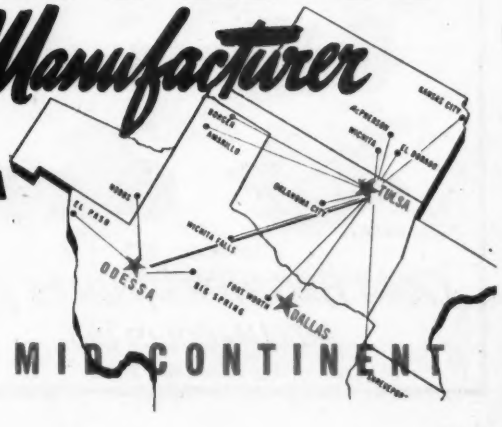
Large and complete stocks will be available at TULSA - DALLAS - ODESSA

*Supply Headquarters for the Refiner*

# VINSON SUPPLY CO

*and Natural Gasoline Manufacturer*

**DALLAS • TULSA • ODESSA**




**Service That COVERS The MID-CONTINENT**

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Our Model S-F 42-T tandem platform, illustrated above, is constructed to handle the extreme load weights common to oil field hauling.

Embodying three-point suspension, this trailer distributes load weights evenly over the tandem axle assembly. Construction of frame at center and sides is specially engineered to withstand the stress of maximum loads. The roll type tail board permits rear loading.

This equipment is tried and proven, being used currently throughout the entire Mid-Continent area by oil field truck operators and producers.

Prompt delivery of this model is assured.

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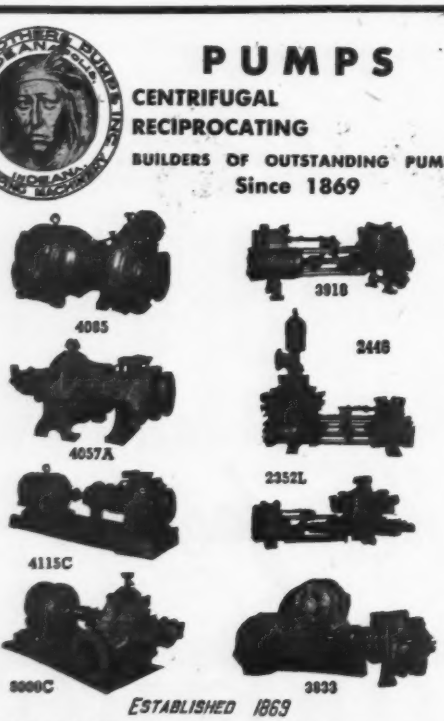


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ONE CENTRIFUGAL PUMP for water service, 2600 GPM, 1750 RPM, 180 ft. TDH, with 440-60 cycle electric motor. Box 1011, Mt. Pleasant, Texas.

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## HELP WANTED

WANTED: Engineer graduate, under 37 years of age, with pipe line experience for position in major pipe line company dispatcher's office. Good chance for advancement. Box B-252, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Chemical engineer for research and development in natural gas conversion. Give complete details, previous experience and training. Opportunity for advancement. Replies confidential. Address Box B-290, The Oil and Gas Journal, Tulsa, Oklahoma.

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MECHANICAL ENGINEER: Refinery Piping Designer, Const. Supt., or surveyor. Age 42, now employed good position paper industry. Desire employment oil refining or production, domestic or foreign. Excellent references. Box B-309, The Oil and Gas Journal, Tulsa, Oklahoma.

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## Union Oil Co. Begins Operations in Alberta

LOS ANGELES.—Union Oil Co. of California has started its first major field operations in Canada with an arrangement for the exploration and development of 227,000 acres of land in Alberta jointly with McColl-Frontenac Oil Co., Ltd.

The tract extends 30 miles into Alberta from the International line. Drilling began later in March. McColl-Fontenac already has done seismograph work in the area and is obtaining gas from several wells.

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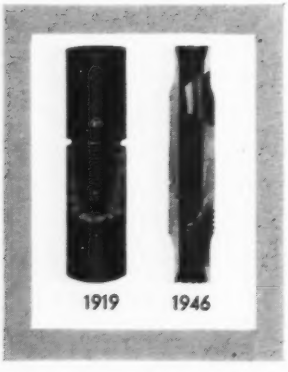


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**In 1919** The first heat-treated alloy steel tool joints were marketed by Hughes Tool Company. These joints doubled the ordinary tool joint life, reduced galling and made faster drilling possible.

**In 1946** Through thirty-seven years of constant research, Hughes has continuously improved its specialized products. Flash-welding and Hard-facing of tool joints have recently been perfected to the point where with proper care and maintenance tool joints should outlast the drill pipe.

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